The Builder.

No. CLXIV.

SATURDAY, MARCH 28, 1846.

IN September last, we gave the particulars, illustrated by diagrams, of some improvements in arranging stoves and other apparatus for heating and ventilating, for which her Majesty's letters patent had been granted to Mr. Leslie.* The improvements contemplate the two-fold advantage of economy of fuel, and a means of ventilation more perfect and extensive, than has yet been ventured on for dwelling-houses.

The plan, our readers will remember, includes the construction of flues of a different form from those usually adopted, viz., a rectangle, 18 by 4½, and the formation of a long, narrow, opening or chase into the flue above the fire-place. The latter is thus described in the inventor's specification:—

"In order to ventilate the kitchen or room in which such apparatus is set, I cause a long opening to be made into the chimney, rising from the upper surface of the boiler to the cornice or ceiling, which opening may be from two to four inches wide; and it will be found that by such means there will be a constant passage of the air from the kitchen or room, through such long opening, by which any impure air will be carried off; and, in order that the outgoing air may not be greater than the case requires for the time being, I have iron covers, shutters, or slides, which may be caused to cover such opening to a greater or less extent, and such covers may be a series of doors, slides, or shutters, one above the other, hinged to the side of the opening; or they may be metal plates moving on axes, in the character of louvre boards, so arranged, that any of them may be closed, or more or less open. And it will be found by this arrangement of apparatus there will be no tendency for the smoke or vapours passing up the chimney from the fire, to pass into the kitchen or room, but there will be a constant draft from the kitchen or room up the chimney, which will not only carry away the products from the fire up the chimney, but also the air from the room or kitchen; thus producing any desired degree of ventilation, as well as an advantageous consumption of fuel."

Now it will be remembered, that both these arrangements are expressly prohibited by the unlucky Metropolitan Buildings Act, which absurdly provides, that "no flue may be used for a smoke-flue which is of less internal diameter in any section than 8½ inches," and that no chimney-breast or flue shall be cut into for any other than two or three particular purposes specified, not including the purpose in question. We say "absurdly" provides that no flue may be used which is of less internal area in any section than 8½ inches, because it assumes a knowledge which, undeniably, is not possessed,—as in the case of drains, the folly of which we have already demonstrated. There are few things of which architects and builders, indeed all, are more profoundly ignorant than they are touching the size, form, and arrangement of flues and fire-places, in proof of which, we would simply point to the tops of the houses in any street or square in the metropolis, or to the abominable disfigurement of the Royal Academy of Arts in Trafalgar-square. And yet, forsooth, the Buildings Act is to forbid, without any ground whatever for the prohibition, that no flue shall be less in any section than 8½ inches!

* See p. 451, Vol. III.

The Act, however, provides for errors of this sort, by giving certain modifying powers to the official referees and Commissioners of Works in the 11th section, "for the purpose of preventing the express provisions of this Act from *hindering the adoption of improvements*, and of providing for the adoption of expedients either better or *equally well* adapted to accomplish the purposes thereof." Accordingly, Mr. Leslie, wishing that his patent should not be confined to the suburbs and the provinces, and learning that permission had been obtained, by a modification of the Act, for the insertion of Dr. Arnott's ventilating valve, forwarded a description of his apparatus to the official referees, and requested the same facilities.

The official referees, as in duty bound, reported the representation to the Commissioners of Works, but to our surprise and regret, accompanied it with the following expression:—"It is our opinion that the modifications requested should not be made, because the same would tend to lessen the stability and security from fire of buildings, which it is the principal object of the Metropolitan Buildings Act to increase and maintain."

The commissioners accordingly decided against the inventor's appeal. The inventor then solicited a statement of the specific grounds on which their opinion was founded, and of any mode by which the objections might be obviated. This was granted, and is as follows:—

"That the form which Mr. Leslie desires to be permitted to adopt for the inside of flues, (namely a rectangle 18 inches by 4½ inches on plan, as shewn by the diagram annexed to his representation) is objectionable as it regards stability of structure, inasmuch as (if permitted) flues might be carried up in 14 inch walls, and tend greatly to diminish the efficacy of party-walls.

That the said form is also objectionable as it regards the tendency which it would have, as we believe, to increase the deposition and accumulation of soot, whilst its long and narrow transverse section would materially increase the difficulty of cleansing the flue; it would indeed require a different apparatus from that in ordinary use.

That the cutting which Mr. Leslie desires to be permitted to make into flues, (namely a slot or chase about 4 inches wide, and the whole height of the breast within any story, or nearly the whole height of the breast from the top of the chimney opening to the ceiling, as shewn in the diagram annexed to his representation) is objectionable, inasmuch as it would materially weaken the structure of the wall in which it might be made.

That the said opening is also objectionable, inasmuch as it would not be properly protected, for Mr. Leslie's apparatus is not self-acting; it is liable from neglect to be left with the valves open.

And, secondly, with respect to the mode by which, in our opinion, "such objections may be obviated so as to insure stability and security from fire, we hereby report,—

That we are not aware that the said objections can be entirely obviated, and having regard to the peculiarly important provisions of the Act to guard against risk by fire, we do not feel that we can submit any mode in connection with the proposed operations, that will ensure stability of construction and security from fire."

Now we have no hesitation in saying that these objections may be removed without the slightest difficulty,—they have really no weight whatever; and knowing as we do, the scientific acquirements of Mr. Hosking, and his own efforts to improve the ventilation of dwelling-houses, to which subject he justly attaches much importance, we feel satisfied that they are the result of wrong or insufficient information. The simplest provision possible, would prevent what the referees deprecate, as to carrying up the flues in 14-inch party walls without additional brickwork, or weakening the walls by the chase; the difficulty of sweeping is merely a joke, and as to the danger from fire, we advise Mr. Leslie to invite the referees (now that he himself is better qualified to develop his ideas than he was when he first applied), to accompany him to Lord Lonsdale's house at Barnes, where his arrangements have been adopted in the sitting rooms, and let them make what experiments they please to arrive at a sound judgment.

When we first alluded to the patent, exercising a necessary caution, we did not express an opinion as to the value of the long chase; we said simply what is unquestionable, that "as a ventilator its effect is necessarily very powerful." Consideration, however, and our recent examination of Lord Lonsdale's rooms, have satisfied us of its value, and of the importance of removing any difficulties that may lie in the way of its adoption, or at all events the adoption of the principle.

Arnott's valve is useful, but limited in its action; whatever is said in favour of its introduction, can be said with still greater force for Leslie's arrangement. It is only by degrees that a knowledge has been obtained of, *how much* pure air is required to support healthy life; the necessity of providing means for getting rid of a corresponding quantity of vitiated air is not yet fully understood. We do hope that the referees will consent to receive fresh evidence on the subject, to see the arrangement in operation, and to re-consider their opinion. In assembly rooms, workshops, hospitals, it will be of the greatest value, and it seems desirable that it should be applied and perfected in the metropolis, and thence spread into the provinces, rather than be kept out of the former by law, until public opinion insists on its admission.

Amongst other advantages, it seems likely to induce a greatly extended use of gas; and as respects decoration, it opens a fresh field. At Lord Lonsdale's the fire-places are faced with painted porcelain, by Copeland and Garrett, with excellent effect, and the valves will be formed of the same material; this is a part of the subject, however, to which we may have occasion to refer at greater length hereafter, our present purpose is, on public grounds, to assist in obtaining immediately such a modification of the Act, that it may no longer hinder the adoption of the arrangements in question.

ROYAL INSTITUTE OF ARCHITECTS.

ENGLAND INDEBTED TO THE ARCHITECTS FOR THE BOODROOM MARBLES.

At the ordinary meeting of the Institute, held on Monday last, Mr. Tite, vice-president, in the chair, much interesting matter came under notice. The subjects for designs and essays, for which medals will be given next year, were announced as follows:—

1 On the adaptation and modification of the orders of the Greeks by the Romans and moderns.

2. On the best system to be adopted, with regard to the arrangements for the thorough drainage of a town house, and of a nobleman's mansion and offices in the country respectively, comprising the general arrangement for carrying off the waters and sewage, the sizes and most convenient forms for the drains or conduits, the requisite fall, the description of material to be employed, and the several precautions for the prevention of damp, smell, and passage of vermin, to be accompanied by block-plans and details.

The Soane medallion to be awarded to the best design for an edifice suitable to the congregational worship of the Church of England and capable of accommodating 1,000 persons

without galleries. The design to be Roman or Italian, expressive of its purpose both internally and externally, presenting as little obstruction to sight as possible. The chancel to be properly marked in plan and decoration with reference to its Protestant uses. All the windows to be charged with stained glass. There must be a conspicuous belfry, but the body of the church is not to be surmounted by a dome.

The inquiry into drainage, we venture to think, was suggested by recent articles in THE BUILDER; the subject is one of extreme importance, and it is to be hoped that the offered distinction may have the effect of inducing some well-qualified person, to take up the subject, aided by all that has been recently propounded, and place it on a proper footing.

Mr. Poynter, honorary secretary, read an account of the stained glass in the Sainte Chapelle at Paris, drawn up in consequence of a wish to that effect expressed at one of the meetings. The building was erected in the 13th century: the greater part of the glass is of the same century, and is more perfect than any other example of the same date with which he was acquainted; although much injury had been done to it, 800 compartments remain, and from two to three thousand figures. Previous to the general restoration of the building, and its coloured decorations, now going forward, the Sainte Chapelle was used for the preservation of records; and when his sketches were made, eight or nine years ago, permission could not obtained to examine the interior without much difficulty. The windows are sixteen in number; the sixteenth, a rosace, is later than the others, and belongs to the 15th century. The ironwork to which the glass is attached is in beautiful forms, circles, semi-circles, lozenges, quatrefoils, &c. The glass is not remarkable for drawing or composition: the fleur-de-lis and the arms of Castile are conspicuous amongst the ornaments. The restoration of the glass has not yet commenced. A few years ago ancient glass was not well understood in France, but at the present time knowledge on this point is more general.

The coronations of kings, the life of Moses, the book of Joshua, history of David, supply the subjects; the figures being nevertheless all attired in the costume and arms of the 13th century. Mr. Poynter then described the windows *seriatim* with the aid of his sketches. Speaking of the general effect, he said the whole is very harmonious; blue preponderates greatly, reds, greens, and violets, being used as contrasts. The stone-work is coloured maroon, and the glass looks much better than it would if it were between jambs and mullions of stone colour. At first sight the subjects are indistinct; the effect is that of the kaleidescope. This harmonious blending of colours is not easy to obtain; it was well understood by the painters of the 13th century. Whether or not, this is the *best* way of treating stained glass, continued Mr. Poynter, is a question. It was not followed when stained glass and good art were joined. One thing is certain, that profusion of detail, obtained either by colour or drawing, is the one thing needful in stained glass.

In answer to a question asked after the reading of the paper, it appeared that the glass is in lead, and that it is simply held up against the iron-work by means of eyes projecting from the latter, through which are passed iron pins.

The chairman then rose and said, he thought it necessary to address a few words to the meeting on the subject of the Boodroom marbles, which, according to an article in *The Times* (partly quoted in THE BUILDER of last week), were on their way to this country. The article said, "Thanks to Sir Stratford Canning, England may now congratulate herself on possessing some of the finest specimens of ancient sculpture in existence," he begged leave, however, to state, it was to the efforts of the architects that the country was primarily indebted for them. Halicarnassus, now called Boodroom, was situated at about the south western point of the coast of Asia Minor; it was the capital of Caria, and the site of the famous tomb of Mausolus erected about 330 years before Christ. The existence of certain valuable sculptures there had long been known, Dr. Clarke gave some account of them in the third volume of his travels (p. 256 and p. 268), and the *Voyage Pittoresque* contained an engraved representation of some of them. In 1839 or '40, the Institute and the Architectural Society, of which latter he was president, simultaneously drew the attention of Government to the fact, and urged in a memorial, the importance of obtaining them for England. With a deputation from the society, he had waited on Lord Palmerston and laid the whole subject before his lordship, who promised immediately to write to Lord Ponsonby and to Admiral Stopford. A firman authorizing their removal was in consequence obtained, but through circumstances had not been acted on till now. From the information he had obtained, he was disposed to think the sculptures did not belong to the tomb of Mausolus, they were probably older than the Parthenon. The only person he could find who had seen them was Mr. Barry, who had not been allowed to sketch them. In conclusion, he congratulated the Institute on having been the means of drawing the attention of Government to these interesting specimens of early art, and on the successful issue of the application.

A paper by Dr. Bromet was then read, descriptive of some curious moulded bricks found in the walls of a 12th century church in Normandy. Some were of a pyramidal form, and others like a fish-scale or a butterfly's wing, and some were parallelopipeds with a singular rectangular projection on the face. Dr. Bromet thought they were of the 6th century and that they were made after Roman models. Moulded bricks were used in England as early as the Saxon times.

Allusion being made to Tudor houses having jambs, mullions, &c., wholly of brick, Mr. Godwin thought it was worth mentioning that Mr. Hitch, of Ware, had made the bricks for several houses in the Tudor style, including the mullions, labels, copings, &c. It was necessary that the bricks should be well *dried* before they were put into the kiln.

Mr. Scoles said Cosecy Hall was a good example of the modern use of moulded bricks.

Mr. Sambroke said that in Munich he found that the bricks for a Byzantine church which was in progress when he was there, were dried for twelve or fifteen months, and then cut by hand like stone.

In connection with brickwork, Mr. Wyatt stated that in a church he was building in Wiltshire, where the walls were faced with Bath stone, the bricks had been laid without mortar, merely grouted together, in consequence of his fear of unequal subsidence, and and that the work was exceedingly solid.

The chairman said it was curious to find that while in England all acknowledged the value of grouting brickwork generally, in France it was not permitted. They went so far there, as to ascribe the fall of the great viaduct at Barentin to the use of grouting.

ORNAMENTAL AND DECORATIVE ART.

DURING the last month Mr. George Wallis delivered a course of lectures at Manchester on ornamental and decorative art. The following is a correct abstract of them:—

Mr. Wallis introduced his subject by the consideration of the artistic, educational, social, and commercial importance of ornamental art; and proceeded to shew how valuable a source of excellence was to be found in its study, and that no artist could really be said to possess the true requisites of his art, without the knowledge which the study of ornament brought with it, as applicable to the necessary adjuncts to an historical picture—*architecture* and *costume;* inasmuch as these give locality and period to such works. The works of McClise were quoted as an extraordinary example of the use of this kind of knowledge; but this artist stands almost alone in its possession. Educationally the subject has been much neglected and misunderstood, and youths are trained up with the notion that nothing is a work of art but a statue and a picture; totally leaving out of the question a knowledge of the various periods of architecture and the various styles of decoration, than which nothing was better calculated to expand the ideas and give increased value to a good education. *Pretty* drawing and *good* drawing are two different things, so a smattering of art and a critical knowledge of it were as widely different. Socially, the lecturer shewed that the importance of this knowledge was great, first as making a stepping-stone for the unassisted artist, by which he could connect his art with the every-day wants of life, and thus gain his bread in an independent manner whilst seeking fame, and on the public, a general diffusion of intelligence in art would be the means of refinement, and frequently of an abstraction from objectionable pursuits. The commercial importance was shewn in the fact that our continental rivals, the French and Germans, had long considered art as a legitimate means of national wealth, in the improvement of their manufactures, and had fostered and encouraged it accordingly. The origin of decoration was based in an inherent love of ornament existing in man, and it was argued that he decorated his body before he clothed it. With clothing came an increased love of ornamentation; and ear and nose rings, the use of coloured feathers, the plaiting of variegated grass, and other means of decoration, shewed another step towards civilization; but the lecturer contended that it was only when art began to be used as an illustration or manifestation of some religious or moral sentiment, that it became truly and legitimately an evidence of progression. Looking upon Egyptian art as the exponent of the earliest positive principle, Hindoo design was regarded as the earliest practical illustration, and the rock-cut temples of India were quoted as examples. The indefinite nature of the principles of Hindoo design was then pointed out, and a comparison made between the decorations of the excavated and the constructed temples. The Hindoo sphinx was quoted as shewing the identity of tradition between Hindoo and Egyptian art, and the difference shewn to consist in the use of the head of a man in the Hindoo, whilst that of a woman was used in the Egyptian. Symbolism as the basis of art, historic and decoration, was well illustrated by an allusion to the Hindoo Pranava; and the earliest representation of their Trinity—Bal Ram, Subhadra, and Jaganath. All art should aim at elevation of sentiment, and it was for a people to decide whether morally it should elevate or degrade, whether intellectually it should instruct or merely astonish.

Architecture was considered as a constructive and not an imitative art, the invention of man, and arising entirely out of previous cultivation of his mental powers, and the means of adapting the materials around him to his wants and wishes, as arising out of the circumstances in which he was placed. Egyptian design was shewn to consist of the adaptation of the type of the cave and tent, and the immense lythic fragments of which the temples of Egypt were composed, was shewn to have arisen out of the monolythic idea engendered by the excavated temples of Nubia, which was described as standing half way in art between the wonders of Ellora and the ever enduring grandeur of Memphis. The severity of form and positive nature of the principles of Egyptian design were fully explained, and its chief peculiarity shewn to consist in the sudden amalgamation of the right line with the curve. The polochromatic effects were illustrated by large coloured drawings of capitals, fragments from ceilings, and decorated musical instruments, and the diaper work was shewn to be geometric in its character, and in many instances similar in forms to the decorations of Etruscan vases. The periods of Egyptian art Pharaonic, Ptolomaic, and Græco-Roman, were briefly summed up, and the distinctive difference of each explained. The purity of feeling observable throughout Greek art was traced to its unity of principle, and its positive adaptation from nature without the conventional being allowed to interfere too far. The principle of Greek construction was laid down as rectangular, and that of the decoration as radiatory and curvilinear. The columnar arrangement was shewn to be based in repetition, but monotony would have been the result but for the skill with which the whole building was proportioned, and the parts arranged. The Panathenaic Frieze was quoted by the lecturer as the positive embodiment of the historic with the ornamental, and its arrangement was demonstrated as based on the same principles which ought to govern the production of all decorative works—a full and perfect adaptation to the purposes and situation for which it was executed. The metopes of the Parthenon were also quoted as equally effective examples.

The lecturer gave a summary of the general results of Greek art, and a powerful exposition

of the principles of ornamental art to be found in the human figure. He considered that the proposition that a student who knew the figure, and drew it well, was therefore capable of drawing and designing other things equally well, was a fallacy, and shewed that though all the principles of a pure type were to be found in the human figure, yet it was all useless unless the student could read, and understand it with reference to his own pursuits. This implied that the student had already studied ornament, for unless he had done so he could not possibly see the analogy, and therefore, to the student whose perceptions have to be cultivated, whose mind has to be stored with images as varied as his artistic wants, the study of one type only, however perfect, is merely the study of one book, on one subject, which, however excellent itself, will not prove much of an instructor beyond the subject on which it treats. To know ornament well, it must be studied for its own sake. A knowledge of the figure would, no doubt, be of great assistance to the intelligent student; but this depended in a great measure upon how he had been taught, for experience had shewn that it had been a stumbling block to those of small capacity, as begetting a conceit of their own powers totally incompatible with their knowledge and ability. But he yielded to no one in his estimation of its high value to the ornamentist equally with the historic artist. Both should be well, thoroughly well taught. Nay, in some instances, he maintained, the ornamentist should be able to draw it with more severity, from the fact of using it without the adjuncts of a back ground; and thus, like the sculptor, his figure must speak for itself without the accessories of a picture.

Roman design, and the spirit in which art was wrought out by these mighty rulers of their age, were exemplified by their treatment of the Corinthian. Grandeur and magnificence was the point at which the Romans aimed, and mistaking bigness for the former, and the overloaded effects of ornamental details for the latter, they lost the purity and simplicity which characterised the works of the Greeks, which they were so ambitious of rivalling. Their mechanical use of the acanthus was forcibly demonstrated, and the clumsy adaptation of geometry to the production of mouldings, instead of using the hand-curve of the Greeks, was also pointed out. The use of the spiral as a primary element in ornament, was also demonstrated, and the different use to which it was put by the Greeks, as compared with the Romans, very plainly shewn. The use of relievi, however, formed one of the most interesting points in this lecture, but would occupy too much space for us to do justice to it; as also the consideration of Etruscan art, which was shewn to be essentially Greek in its principles. The method of construction adopted in the forms of the vases was demonstrated. Pompeiian design was illustrated by admirably executed drawings of large size and excellent effect. The polychromatic effects were traced back to Egyptian art, and the forms shewn to be based on Greek, with a Roman feeling in the adaptation, and the combination of the historic with the ornamental, was shewn as an exemplar for our guidance in decoration, particularly as Pompeiian art is in a great degree domestic in its application.

The transition from pagan to Christian art, was a result which arose out of the transfer of the seat of the Roman empire from Rome to Byzantium. This change was attributed to those Greek artists who followed the Emperor Constantine to this city of the east, and their adaptation of the fragmentary constructions of the western empire to the requirements of their new faith, modified in a degree by an Asiatic peculiarity in all probability found already existing in the city in which Constantine desired to revive all the glories of Memphis, of Tyre, of Athens, and of Rome. Byzantine design, as the earliest Christian was proved to be essentially mosaic in its character, and this might probably have originated in a degree in some of the peculiarities of early Persaic art. The identity of the relievi of the Byzantine with Saxon and Norman art was fully proved. Persian, Turkish, and Moresque design were each considered, and the adaptation of the principle of the Greek fret to Turkish decoration was shewn to consist in the use of the diagonal instead of the perpendicular and horizontal lines only. The Moresque style was illustrated, and the peculiar character of the ornaments traced out, and illustrated by reference to the simplest principles of geometry. Early Italian art followed, and the works of Cimabue, and his pupil Giotto, were quoted as examples of that spiritualization in design which reached its perfection under Raffaelle. The arabesques of this prince of painters were quoted as a proof how thoroughly he understood every thing appertaining to his art; and the works of his pupils, Julio Romano and Giovanni da Udine, were further evidence of the value of his school in the training of true artists. British art, as the perfection of Gothic design, to use the popular phrase, formed an admirable field for disquisition, and the lecturer proved how completely and perfectly the arts were at one time developed in Britain. Illuminated MSS., decorated silks and velvets, stained-glass windows, ornamental ironwork, and the painted and gilded effects produced in the decorations of the cathedrals of this country were glanced at.

Italian art in the 16th century, and the absurdities of Bernini and Borromini were next noticed. The advent of the Renaissance in the works of that artist-goldsmith Benvenuto Cellini was considered, and a rapid glance taken of the style of Francis I., of France, as displayed at Fontainebleau. The Italian origin of French art was thus traced through, and the employment of such men as Rubens, Poussin, and Philip de la Champagne, in the decorations of a room in the Luxembourg, quoted as a proof that artists were in those times much more of workmen than at present. Elizabethan, and the domestic architecture and decorations of the Tudor age next received attention, and the carved furniture of the period quoted as a proof how largely art entered into the service of every-day life. The classic revival which occurred after the restoration, was argued as having done more injury to true art than all the destruction and whitewash of the puritans, and the no-taste displayed in some of the continental cathedrals, in the placing of classic screens across Gothic buildings, shewn to have originated in the same source with much of the literature of the time—a constant following after classic models. The leading features of the style of Louis XIV. was then explained, and the sentiment in which it originated proved to be that of self-glorification, a perversion of the true purposes of art from the embellishment of religion, morality, and patriotism, to that of vain-glory. Louis XV. and the pastoral school were glanced at, and Chinese, as a *modern* style, was argued as possessing the essential principles of a true style of decoration. Modern French being compared with modern German, the sentiment of the latter was shewn to be superior alike in originality and purity.

The course of lectures was concluded by some appropriate remarks as to the present state of the arts in Britain, and the *material* was denounced as standing in the way of the *spiritual*. The British public looked for matter-of-fact productions, not for the elevation to be found in the ideal. Our ornamentists were little else but dove-tailers of the odds and ends of every style of every age; and instead of looking to principles first, as arising out of the study of the antique, then to nature as a new source from whence to adapt forms for the illustration of their own age, country, and literature, they either slavishly copied all that had preceded them on the one hand, or totally neglected every thing in the shape of ornament on the other; consequently our schools formed nothing but puny painters of pretty pictures, ambitious spoilers of colours and canvass, whose ideas never ranged beyond dog-kennels or heaps of lumber.

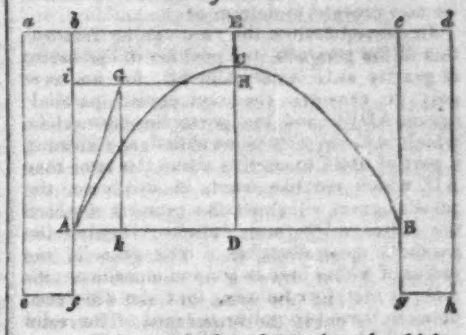
NEW CHURCHES.—At a meeting, held last week, of the Society for Enlarging, Building, and Repairing Churches and Chapels, grants were made in aid of the erection of new churches as follows: at Collier-street, in the parish of Yalding, near Maidstone, and at Wolsden, in the parish of Rochdale. For rebuilding, with enlargement, the parish churches of Llangaffno, near Carnarvon; Shalford, near Guildford; Wambrook, near Chard (the town excepted), and Aspatria, near Carlisle. Also for erecting transepts to the Church of St. Barnabas, Liverpool, erected in the year 1841.

ON THE EQUILIBRIUM OF PIERS.

THE cases of this problem previously illustrated had reference to the semi-circular and segmental arches proposed in the secon; volume of Dr. Hutton's course of mathematics (see p. 8, *ante*); but since arches are frequently built of other forms, such as the *parabola*, the *ellipsis*, the *hyperbola*, the *cycloid*, the *curve of equilibration*, &c., we should consider the solution of the problem as being incomplete if these other curves were omitted, but more especially the *ellipsis*, the *hyperbola*, the *cycloid*, and the *curve of equilibration*. The *parabola* being used only on certain occasions, is of less importance, but since it *does* sometimes occur in military works, it may be as well to bestow a little attention on it, and because it is somewhat simpler in its nature, than any of the other curves just mentioned, we will begin our investigations with it.

Let ACB fig. 3, be a parabolic arch, of which AB is the span, DC the axis or rise, CE the thickness at the crown or length of the key-stone, and *abfe*, *cdhg* the piers by which it is supported, the road-way and the top of the piers being in the same horizontal

Fig. 3



plane; it is required to determine the thickness of the pier to support the arch in equilibrio without the reaction of any other arch; the piers being of the same rectangular form as represented in the drawing.

Since the axis CD bisects the arch ACB in C, it divides it into two equal and symmetrical portions AC and BC, and for this reason, the mixed figures ACE*b*, BCE*c*, contained between the arch, the piers and the roadway, are also equal and similar with respect to the portions of the arch on which they rest; it therefore appears, that each pier must sustain one half of the materials that constitute the arch, so that the area ACE*b*, is a proper representative of the weight of the materials which the pier has to sustain.

Let G be the position of the centre of gravity of the area ACE*b*, and through the point G draw iH parallel, and G*k* perpendicular to the horizon, and draw the diagonal GA; then, since the point G is the centre of gravity of the semi-arch ACE*b*, it may be considered as the place of that semi-arch; for by the principles of mechanics, if the whole mass were concentrated in the point G, it would produce the same effect on the pier as is produced in the usual state of a balanced arch; consequently, if the vertical line G*k* denote the weight of the incumbent materials, or the tendency of the semi-arch to descend in the direction of gravity, then will *k*A denote the horizontal thrust against the pier, to turn it about the point *e*, that angle of the pier acting on the ground as a fulcrum. This, however, supposes that the pier is free to move about the point *e*, and that there is no resistance offered to the thrust by friction, or the adhesion of the mortar.

If we conceive the horizontal force which acts in the direction *k*A, to be exerted at the extremity of a lever A*f*; then its momentum to overturn the pier will be $k\text{A} \times \text{A}f$. Now, if the whole effort of the weight in the direction of gravity be represented by w, that portion of it which acts in the direction *k*A, will be $\frac{w \cdot k\text{A}}{\text{G}k}$; for according to the *parallelogram of forces*, it is

$$\text{G}k : k\text{A} :: w : \frac{w \cdot k\text{A}}{\text{G}k}.$$

Therefore, by substituting this result for *k*A in the expression for the momentum to overturn the pier, we get

$$k\text{A} \times \text{A}f = \frac{w \cdot k\text{A} \cdot \text{A}f}{\text{G}k},$$

But when the semi-arch and the piers are in equilibrio with each other, the momentum of the one must be equal to that of the other. Now the weight of the pier will be appropriately represented by its area $bf \times ef$, in like manner as the weight of the semi-arch is represented by the area ACE*b*; and the leverage by which it resists the horizontal thrust of the semi-arch, is equal to one-half of ef; the centre of gravity of the parallelogram *abfe* being situated in the centre of magnitude; consequently, the momentum of the pier to resist the horizontal thrust of the semi-arch, is $\frac{1}{2}ef^2 \cdot bf$: therefore, by equating this with the momentum of the semi-arch, we get

$$\tfrac{1}{2}ef^2 \cdot bf = \frac{w \cdot kA \cdot Af}{Gk}.$$

This equation is general, and will assume the same form whatever may be the nature of the curve on which the arch is formed. Reducing it in reference to ef, the thickness of the pier, we get

$$ef = \sqrt{\frac{2w \cdot kA \cdot Af}{bf \cdot Gk}}. \quad \ldots\ldots (I)$$

In this equation the quantities Gk in the denominator of the fraction, and kA in the numerator are unknown, and it is these that we now proceed to determine.

In consequence of the very simple mensuration of the parabola, the position of the centre of gravity at G is easily found; for we have only to consider the rectangular parallelogram ADE*b*, and the parabolic space ACD, which is in the same plane with it, and forming a part of itself, to revolve about the semi-base AD, which remains fixed, in this case, the parallelogram will generate a cylinder of which the radius is DE, and altitude AD, while the parabolic space describes a conoidal solid, the radius of whose base is DC and altitude or axis AD; it therefore follows, that the difference between these two solids is equal to the solid generated by the figure ACE*b* during the revolution.

By the rules of mensuration, the solidity of the generated cylinder is expressed by the term $3{\cdot}1416AD \cdot DE^2$, and that of the conoidal figure by the term $1{\cdot}67552AD \cdot DC^2$; and the difference of these is

$$3{\cdot}1416AD \cdot DE^2 - 1{\cdot}67552AD \cdot DC^2 = 1{\cdot}67552AD(1{\cdot}875DE^2 - DC^2)$$

This is the solidity of the figure which is generated by the revolution of the semi-arch ACE*b*; but it is evident, that while the semi-arch revolves about AD, and describes the solid just named, the centre of gravity G describes a circle whose radius is kG; and by the properties of Guldinus, the solidity of the figure described by the revolution of the plane ACE*b*, is equal to that of a prism whose base is the area of the describing plane, and altitude equal to the circumference of the circle traced out by the centre of gravity of that plane; consequently, by having both the area of the semi-arch, and the solidity of the figure generated by that area, the position of the centre of gravity, in reference to the semi-base AD, can readily be found. This is the principle to which the reader's attention is more particularly directed; for by its application, the position of the centre of gravity of the balancing materials of an arch can be more readily found than by any other method whatever, since it requires no other knowledge than the simple rules of mensuration.

The area of the semi-arch ACE*b*, is equal to the difference between the rectangle ADE*b* and the semi-parabola ACD; but the area of the rectangle is expressed by the term $AD \times DE$, and that of the semi-parabola by $\frac{1}{3}AD \cdot DC$; and the difference of these is $AD \cdot DE - \frac{1}{3}AD \cdot DC = AD\,(DE - \frac{1}{3}DC)$, and it has been shewn that the solidity of the figure generated by that area, is $1{\cdot}67552AD\,(1{\cdot}875DE^2 - DC^2)$; therefore by division, we get

$$\frac{1{\cdot}67552AD\,(1{\cdot}875DE^2 - DC^2)}{\frac{1}{3}AD\,(3DE - 2DC)} = \frac{5{\cdot}02656\,(1{\cdot}875DE^2 - DC^2)}{(3DE - 2DC)}$$

This is the circumference of the circle described by the centre of gravity of the semi-arch, and the radius will be found by dividing by 6·2832; hence we have

$$\textit{co-ordinate, } kG = \frac{0{\cdot}8\,(1{\cdot}875DE^2 - DC^2)}{(3DE - 2DC)} \quad \ldots (K)$$

This equation expresses the value of the vertical distance between the base or span of the arch, and the centre of gravity of the semi-arch at G, and by a similar process the horizontal co-ordinate, or the distance between the axis and the same centre of gravity, can readily be found. For let us now suppose, that the rectangular plane ADE*b*, and the semi-parabola ACD, perform their revolutions simultaneously about the axis DE, which remains fixed, the one will generate a cylinder whose radius is AD, and altitude DE, while the other generates a paraboloid, whose radius is AD and axis DC. But by the rules of mensuration, the solidity of the cylinder is represented by the term $3{\cdot}1416AD^2 \cdot DE$, while that of the paraboloid is represented by $1{\cdot}5708AD^2 \cdot DC$, and the difference of these is

$$3{\cdot}1416AD^2 \cdot DE - 1{\cdot}5708AD^2 \cdot DC = 1{\cdot}5708AD^2\,(2DE - DC).$$

This is the solidity of the figure described by the semi-arch revolving about the axis DE, and we have already seen, that the area of the describing plane, is represented by $\frac{1}{3}AD\,(3DE - 2DC)$; therefore, by division we get

$$\frac{1{\cdot}5708AD^2(2DE - DC)}{\frac{1}{3}AD(3DE - 2DC)} = \frac{4{\cdot}7124AD(2DE - DC)}{(3DE - 2DC)}.$$

And this is the circumference of the circle described by the centre of gravity of the semi-arch while it revolves about the axis DE. Let this be again divided by the constant number 6·2832, and we obtain for the

$$\textit{co-ordinate, } GH = \frac{{\cdot}75AD\,(2DE - DC)}{(3DE - 2DC)},$$

and if this be subtracted from the semi-base AD, it becomes

$$iG = AD - \frac{{\cdot}75AD(2DE - DC)}{(3DE - 2DC)}.$$

which, being reduced to its simplest form, gives

$$iG = kA = \frac{AD(1{\cdot}5DE - 1{\cdot}25DC)}{(3DE - 2DC} \quad \ldots (L)$$

Now, if these values of kA and kG, that is, the horizontal and vertical co-ordinates, be substituted instead of them in the equation marked (I), we shall obtain

$$ef = \sqrt{\frac{2w \cdot Af \cdot AD\,(1{\cdot}5DE - 1{\cdot}25DC)}{bf(1{\cdot}5DE^2 - 0{\cdot}8DC^2)}},$$

And, finally, by substituting $2AD(DE - \frac{1}{3}DC)$, or twice the area of the semi-arch, for $2w$, the expression for the breadth or thickness of the pier, becomes

$$ef = \sqrt{\frac{2Af \cdot AD^2(1{\cdot}5DE - 1{\cdot}25DC)\,(3DE - 2DC)}{bf\,(4{\cdot}5DE^2 - 2{\cdot}4DC^2)}} \quad \ldots (M)$$

In this equation there is nothing but known quantities, all having reference to the dimensions of the arch and its supporting piers; it is, however, of such a form as not to admit of being clearly expressed in words, and consequently the method of reducing it must be obtained by an attentive examination of the several steps in the working of the following example:—

Example 3.—Suppose the arch ACB to be a parabola, of which the span or base AB is 40 feet, the axis or height DC 20 feet, the thickness at the crown CE 4 feet, and fA, the distance between the bottom of the pier at f and impost at A 8 feet; what must be the thickness of the pier to sustain the thrust of the arch, the summit of the pier and the roadway being in the same horizontal plane?

Here, then, we have given $Af = 8$ feet; $AD = 20$ feet; $DC = 20$ feet; $DE = 20 + 4 = 24$ feet, and $bf = 20 + 4 + 8 = 32$ feet. Hence we get, $1{\cdot}5DE - 1{\cdot}25DC = 24 \times 1{\cdot}5 - 20 \times 1{\cdot}25 = 36 - 25 = 11$;

$3DE - 2DC = 24 \times 3 - 20 \times 2 = 72 - 40 = 32$;

$2Af \times AD^2 = 8 \times 2 \times 20 \times 20 = 16 \times 400 = 6400$;

Then, if these three results be multiplied together, we get $11 \times 32 \times 6400 = 2252800$; this is the numerator of the fraction under the vinculum in equation (M), and the denominator is found as follows:—

$$4{\cdot}5DE^2 - 2{\cdot}4DC^2 = 4{\cdot}5 \times 24 \times 24 - 2{\cdot}4 \times 20 \times 20 = 2592 - 960 = 1632,$$

which being multiplied by $bf = 32$, we get, $1632 \times 32 = 52224$ for the denominator of the fraction; therefore by dividing and extracting the square root, we obtain

$$ef = \sqrt{\frac{2252800}{52224}} = \sqrt{43{\cdot}1372} = 6{\cdot}57 \text{ feet}$$

very nearly.

N. B.—This form of arch is very frequently employed in the construction of powder magazines and other military works. T.

DWELLINGS, DRAINS, AND SUPPLY OF WATER IN THE CITY.

On the 12th inst., Dr. Lynch presented to a Court of Common Council a well-timed and judicious petition on subjects of the utmost importance, as affecting the health and well-being of the community, and supported the prayer of it in an admirable speech, which ought to be published in a separate form and distributed throughout the country.

We purposely avoided reference to the statement at the moment; when it occupied the attention of the daily papers, in order by recurrence, to increase its effect. The subject being of permanent and engrossing interest, we feel impelled to record the petition in full:—

"To the Right Hon. the Lord Mayor, the Aldermen and Commonalty of the City of London, in Common Council Assembled.

The following petition of the Metropolitan Working Classes Association for improving the public health.

Humbly sheweth—That the corporation have set the example of applying a large, and as your petitioners are informed, a sum of no less than 20,000*l.* per annum, to the improvement of the city as a part of the metropolis.

That your petitioners think the improvements good in themselves; that the widening of the streets is good as a means of ventilation; that your petitioners admire wide and magnificent streets, and take pride in the improved general aspect of the city and of the metropolis. But they humbly submit, that whilst all is thus made fair and good to behold without, all should not be left foul and miserable within; and that these benefits may be carried out otherwise than to the injury of the working classes, which effect has been and is now produced.

Your petitioners aver, that by every old street occupied by the labouring classes pulled down to form a new street, the evil of overcrowding the existing old streets, courts, and tenements near the street pulled down, is generally aggravated.

Your petitioners know that this effect was produced by the pulling down of houses to form the Farringdon-market. They know (and it is in evidence before the Commissioners for Inquiring into the Means of Improving the Health of Towns) that the like effect was produced by the pulling down old houses to form the Blackwall Railway. They know that the like effect has been produced by the removal of the old and poor houses to form the new streets which traverse the site of St. Giles's. Good new streets have been formed, but the poor population of St. Giles's has been only wedged in more densely upon the poor population of Seven Dials, and the bad made worse.

Your petitioners see that new lines of railway are proposed to be carried, some into the city of London, others through other parts of the metropolis, and that large numbers of old houses are to be pulled down, but they see no provision made, or consideration given, for building new ones for the accommodation of the poor people who cannot remove from their places of work.

Your petitioners pray that whilst the corporation devotes its funds to the formation of new and magnificent houses, it will at the same time exercise its power in building for the working classes, at reasonable and yet remunerative rents, improved tenements, in numbers equal to those pulled down, and by so doing a benefit will be conferred, instead of an injury inflicted, on those whose condition most need improvement.

Your petitioners observe with much satisfaction that new large main sewers are in course of construction down the main streets. They regret, however, to find that the streets occupied by the labouring classes are still badly drained; that their houses are still left undrained; and whilst in the new prisons, and for the use of prisoners, an apparatus of the nature of a water-closet is provided, and a supply of water carried into each cell, the houses of the working classes are only provided with disgusting and unwholesome privies and cesspools, and have only dear and bad supplies of water, kept stagnant in butts in the yards, exposed to contamination from soot and dust.

Your petitioners further pray, that at the same time that drains for houses and sewers for streets are provided, your hon. Court will exercise its power and influence to procure a good constant supply of water to make the drains and sewers to act, and constantly remove all accumulations of offensive matter, and to have such supplies carried at a cheap rate into every set of rooms occupied by honest and industrious labouring men, who are willing to pay a fair and reasonable rate for the accommodation; whereas the price now charged for bad supplies, is proved to be more than three times the amount for which supplies of a better description might be ensured.

Your petitioners humbly represent, that besides sewers' rates, payment of scavenging, and cleansing rates are made on account of most of the houses occupied by the labouring classes. That whilst their houses are badly drained, and the streets, in respect to which the owners or occupiers pay scavenging rates, are badly cleansed; and that, however the service of the scavenger may be contracted for, and paid for, the duty is rarely if ever properly done. Your petitioners beg leave to bring before your notice the evidence, in this respect, of the medical officers, given in answer to the inquiries made under the authority of the Government, and appended to the report on the sanatory condition of the labouring population."

We would gladly give the whole of Dr. Lynch's observations, but are prevented by our narrow limits. He said it was a subject of congratulation with every reflecting mind to see the working classes struggling to improve their social condition. It was one of the most gratifying results of the diffusion of useful knowledge, and one of the best signs of the times. That laudable endeavour had originated with their clear-headed brethren in Edinburgh, Glasgow, and Dundee, where public meetings were called and resolutions adopted, that shewed how well they understood the evils and the means best calculated to remove them. The determination to form similar associations in each of the great towns of this country had met with encouragement from the highest, the noblest, the most pious, and some of the most scientific in the land. The wants of the poor, who were dispossessed by the alterations, had been entirely overlooked in the new arrangements. That was a great evil, and had a strong tendency to aggravate all the evils arising from the neglect of proper sanatory regulations, and affecting the comforts and even the lives of the working classes to an extent that would appear quite incredible, if it was not for the searching and well-digested investigations of the Parliamentary commission for inquiring into the health of towns. Although every other class had been benefited by the march of science, no provision had been made for the benefit of the working classes. The result was, that one-half of the children born in Great Britain died before they reached five years of age; and taking the young and the old together, 26 years was the average at which people died in London, and 17 in Liverpool. 50,000 died annually of diseases, which might be prevented by proper precautions. It appeared, from indisputable calculation, that the class of artisans, instead of attaining the average, were cut off at 19, thus losing 15 years of existence, and including in that the loss of 15 years of productive labour to society. In the ward of Farringdon-without, the habitations of the poor were in the most deplorable condition. Behind the finest streets, with their magnificent plate-glass windows, displaying the most costly productions of the earth, was to be found a revolting mass of filth and misery, which it was impossible to describe. In Holborn they had Field-lane, and its shocking courts. On the other side they had Plumtree-court, with 600 inhabitants in 28 houses, the houses not averaging more than four rooms each; the rooms were but 8 feet in height and width, and the average of occupants was six persons in each room, while the inspector of prisons allowed a room of 10 feet to every individual prisoner. The houses in the court were built back to back, and the cellars, which contained an accumulation of every filth, were never cleared out. From these nests of pestilence were hourly issuing poisonous gases fatal to animal life. They need not but enter a newly-painted room to find how soon substances suspended in the air, imperceptibly entered and impregnated the fluids of the body. So fatal were the effects of the poison to which he alluded, that medical men were afraid of applying a blister to a patient, from the fear that it would run into a mortification. Similar close courts, in an equally bad state, were to be found off Fleet-street. In the Old Bailey there were nine courts, all without sewers. Contagious diseases were never absent. In Black Bear-alley, which was only two yards wide, and had but five houses, he had himself attended in one summer forty cases of typhus. By the census returns, the average in England and Wales was five persons to each house, but in John's-court, and Crown and Phœnix-court, West-street, he found in three-roomed houses eighteen people to each house. In some of the dens, called lodging-houses, he had found six beds in a room, with two and three persons in each bed, at 2d. a-head. In Fetter-lane there were 2,000 inhabitants in 145 houses, and in Plough-court, in thirty houses, there was an excess of 400 over the healthy standard, and no sewer to mitigate the impurities. The number of occupants in a house might be taken as a good criterion of their circumstances. There were twice as many residents in the wretched hovels as in the better class of lanes, and it was exactly where it was most wanted that there was the greatest absence of every sanatory provision. Both physical and moral deterioration were the inevitable consequences of all that misery. That the morals of the people were contaminated by such means was undeniable. To mitigate the evils so inadequately described, they must in the first place provide a constant and unlimited supply of water to the poor. They must shut up the wretched hovels which generated disease, and appropriate some of their vast revenues to accommodate the poor with cheap, well-drained, and well-ventilated dwellings. Of the 125 who died daily in London, fewer than nine died of old age. The supply of water in London was a gross monopoly in the hands of a private company, and their charge was most exorbitant. Dr. Lynch here exhibited the prospectus of a company, with Lord Francis Egerton as chairman, and Mr. Baring and Mr. Jones Loyd as trustees, which was ready to furnish the metropolis with filtered water forty gallons per diem to each house, at the rate of 2d. a week, or 7s. a year. Amongst the many wise dispensations of Providence, there was none that more clearly indicated its Divine origin than the intimate connection which subsisted between our interest and our duty. Whatever was best calculated to promote the well-being of the human family, would be found to be the most economical in the end. On the contrary, whatever violated a sanatory law, or tended to produce suffering amongst any portion of the people would be found to operate injuriously upon the rest. Here was a bond of union between the different classes, which rendered it an act of common prudence as well as of humanity to observe the condition and provide for the comforts of those who stood lowest in the social scale. Ancient cities, once the envy of surrounding nations, had fallen because they did not secure their permanency by providing for the happiness and improvement of the masses. The interest of the labouring man ought to be an object of endearing interest with the members of that court. By labour the country had obtained within the last fifty years a mechanical power equal to the labour of 500,000,000 of human beings. London boasted to be the centre of civilization, the mighty heart of the political frame, whose size and wealth, whose pomp and commerce had gathered within its limits all that could contribute to the wants and pleasures of mankind. He referred to this picture of its greatness and glory, in order to contrast it with the deep disgrace of having such hovels as homes for the productive classes, in the very heart of the first city of the first empire of the world. He hoped, however, that they would now act a part more consistent with their honour—that having done so much for the ornamental, they would at length do something for the useful, and lay the foundation of a good work for which the press would praise them, the people would bless them, and their own consciences would reward them, as benefactors of the poor and the afflicted. Dr. Lynch concluded by moving that the petition be referred to the Improvement Committee.

Mr. Anderton seconded the motion.

Mr. King, with more bravery than good judgment, said he looked upon the appeal as ridiculous and nonsensical! and was determined for the sake of *common sense* to give it his most strenuous opposition.

Mr. Stevens evidently had the whole court with him when he replied to Mr. King with the remark, that it was important to the working classes that the court should at all events, manifest its sympathy with them. It had been intimated that the petition had a visionary object. When it was said that cleanliness could be produced, if the inmates of these wretched habitations were supplied with water, was that he would ask merely visionary? Was it merely a visionary good, if the tottering and miserable hovels which abounded in the city were pulled down, and substituted by cottages in which cleanliness could, according to the statement of Dr. Lynch, be supplied at so cheap a rate? Whatever the court might ultimately be able to do, it was at all events the duty of the court to treat such an appeal, not with sneers, but with respect and attention.

Mr. Stacy said it was allowed on all hands that an abundant supply of water, would effect a sort of revolution in the densely crowded lanes and alleys of the city. If the Commissioners of Sewers would begin by directing their labours amongst the inhabitants in supplying them with the one great necessary of health, the good example would be speedily followed, and all classes of the community would feel the blessing of the benefits.

Sir James Duke strongly supported the motion, which was ultimately agreed to by an immense majority.

We earnestly beseech every corporate body in the kingdom, to consider that the same petition and statement have been laid before them, and to give instant and earnest attention to the various points embraced by them The question is of universal concern, and demands immediate attention.

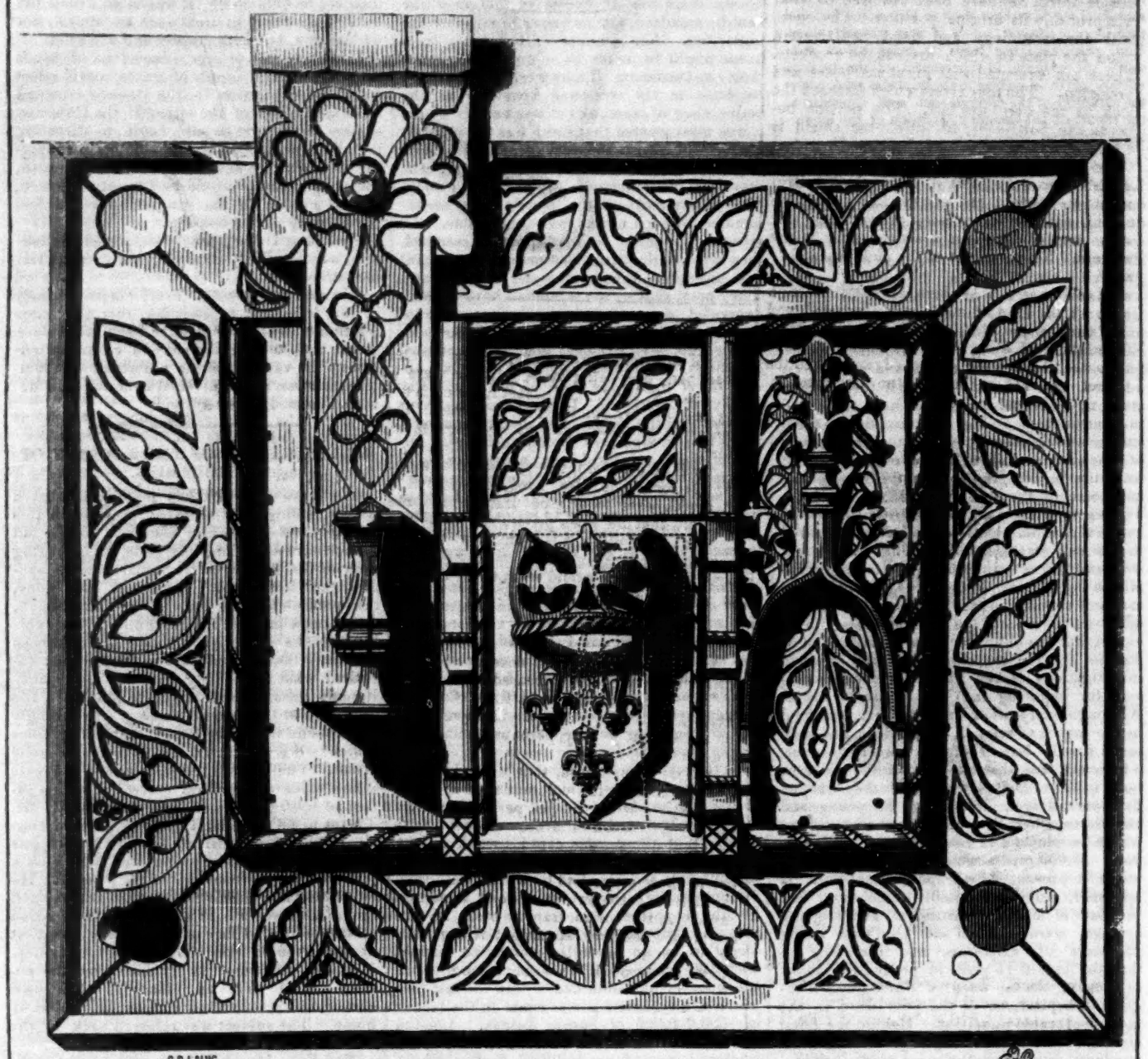
REGENERATION OF THE SOCIETY OF ANTIQUARIES.

We have several times mentioned that a strong feeling of discontent prevails in this ancient and important society. While all around were active and energetic, the managing body of the Society of Antiquaries were apathetic and indifferent. Little has been done, the weekly meetings have become a reproach, and though more life is beginning to be exhibited by the executive, it is not sufficiently so to satisfy those members who have a just notion of what the society, with its long standing and great power, ought to do. On the 19th instant the general feeling was strongly shewn, and it is to be hoped that the opinions which were expressed will produce a good result. The council had determined to create a new office of assistant secretary, with a salary of 150*l.* per annum, and had chosen Mr. Thoms to fill it. Mr. Pettigrew shewed conclusively, so conclusively that not a word was said in support of the proposition, that such a step was directly contrary to the charter. He expressed his astonishment that the council and vice-presidents, at a moment when beyond all others the welfare of the society was most at stake, should have ventured on such a step. It was of the utmost importance that the society should have an officer of their own choice, and a man known abroad as well as at home. The subject was referred back to the council.

The Rev. Joseph Hunter said, all the difficulties at present existing in the society were owing to the mode in which the council were elected. They were not the council of the society, but were the representatives of a party unknown. Mr. H. ultimately moved that in future the secretary should not prepare any house list. An amendment was moved to the effect that the house list should be sent round to the members a short time before the day of election, and ultimately the further consideration of the subject was adjourned till the next meeting. Lord Northampton, Sir H. Ellis, Mr. Disney, Mr. C. Robinson, and others took part in the discussion. Mr. Amyot was in the chair.

Last Thursday evening, Lord Mahon, on taking the chair, communicated a letter from the Earl of Aberdeen, expressing a desire that the council should elect another president at the annual meeting. A vote of thanks to his lordship, moved by Mr. Pettigrew, and seconded by Mr. A. J. Kempe, was passed unanimously. Relative to the question on which the adjournment was moved, the chairman announced, that the council had determined on forwarding the house list to each fellow eight days before the election. Mr. Thoms explained, that his part in the preceeding discussion was quite involuntary. Mr. Hailstone, Mr. Lott, Mr. Tite, Mr. Taylor, and Mr. Hallam, besides the members above-named, addressed the meeting. Considerable excitement prevailed, and much credit is due to Lord Mahon for his able conduct in the chair.

ANCIENT WROUGHT LOCK AND KEY.



C.D.LAING

THE IRONWORK OF THE MIDDLE AGES.

The present increasing value of the metals, as applied to constructive purposes, whether in buildings, in railways, or machinery, indicates a remarkable period in the history of science and the useful arts. But it would be difficult to call to recollection any period in which their importance, as materials susceptible of the influence of design, has had so inadequate an estimate. In the last volume of The Builder,* this fact was noticed in a leading article, and, subsequently, an endeavour was made to draw further attention to the same subject.† In the earlier periods of the Gothic style, we find that ironwork played an important part in the decoration of the doors, the hinges being, in fact, the only decoration. They covered the whole door in beautiful scrolls, as may be seen at Lichfield and Windsor. At a later period, the material was wrought into equally beautiful forms in locks, latches and keys, sconces, screens, coffers, shrines, with many others. In all these, as before referred to, we discover that particular treatment, which is peculiarly suited to the material, and is also capable of producing a result greatly surpassing the effect of cast-iron, as at present worked. The subject treated, in each case, seems to have been a labour of love, to one whose ambition it was to engraft the influence of art upon what was the work of hands, but which the result elevated above the rank of a craft.

The lock, which in modern doors and chests is mortised in the wood, was formerly a subject on which the artist exerted all his ingenuity. The early locks seem to have been either padlocks, or to have had the simplest form. But at a later date, when doors and chests were panelled with elaborate tracery, the lock became similar to the example given above. It was sometimes enriched with leaf and scroll work, with ogee canopies and elaborate panelling, sometimes the catch had the figure of a saint, and even the rivets were converted into beautiful forms. The wards of the lock in the examples before us, display no great skill, though we find very ingenious contrivances for security in specimens of later date. The lock of a casket, in the possession of the late Mr. Rhodes, placed on the underside of the lid, has four bolts to shoot in different directions by one turn of the key. But there was often some contrivance to conceal the key-hole in locks of the period under notice. In the *Instrumenta Ecclesiastica*, now in course of publication, there are several illustrations of iron-work, including escutcheons and handles to doors. There is also a drawing of a lock to the chest at Great St. Mary's church at Cambridge, which shews it in its position with the wood-panelling. This example is, however, not equal to the present one, and is drawn with such a character of regularity, that we can hardly think it represents the precise appearance of the old work, which wanting the precision attainable by mechanical aids, and by turning the circles in with compasses, has nevertheless an impress of integrity upon it, which is more pleasing than the unvarying outlines of the machine. To express these points accurately, and in other respects to give a faithful representation, we have made the drawing the full size.

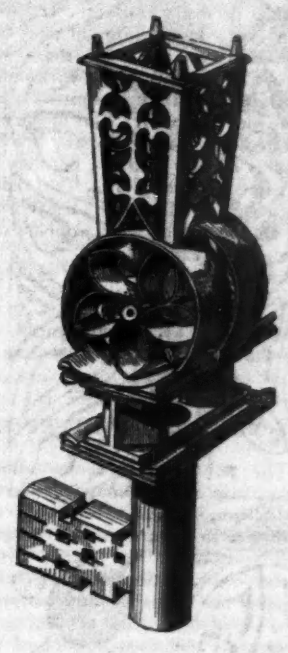
The example here shewn gives an excellent idea of the usual mode of execution in such subjects. The traceried portions, as in each side of the border, are formed of three distinct and thin plates, separately pierced and closely rivetted together. The third plate is uncut in this instance; in many cases the panels were open. The catch has only two plates fastened to a groundwork of the requisite strength; the rivet at the top may not be original. The edges, the twisted beading, the buttresses, the shield, the mouldings of the ogee, with the finial, the crockets, the handle of the catch, are all wrought out of distinct pieces by

* Page 97.

† Vide "Gothic ironwork considered in reference to its influence upon the future development of the style," vol. III., p. 397, and elsewhere.

stamping or filing. The fleurs de lis are wrought separately, and rivetted to the shield, which again is fastened to the piece below it. The coronet is cut from thin plate, and is curved forward in semicircular form. The ogee, which in the lock itself has been turned upside down, has here been restored to what was probably its original position. The ogee, with the mouldings and finial, are rivetted upon the plate in which are cut the crockets. These are executed with great sharpness and precision. The four rivets which fastened the lock to the chest are lost. The portion between the buttresses, to which the shield is attached, concealed the key-hole, and was fastened by spring lever and snap, as shewn by dotted lines. To open it, a crooked instrument was introduced at the hole near the shield, and the lever being drawn back, the door turned down on a swivel axis at the bottom. The material of the lock is polished steel.

It will be seen, that there is great distinction between the kind of work here illustrated, and the modern practice, even in *wrought* iron. The labour of filing was inconsiderable, when separate pieces were employed, and when the object was not to imitate the treatment of



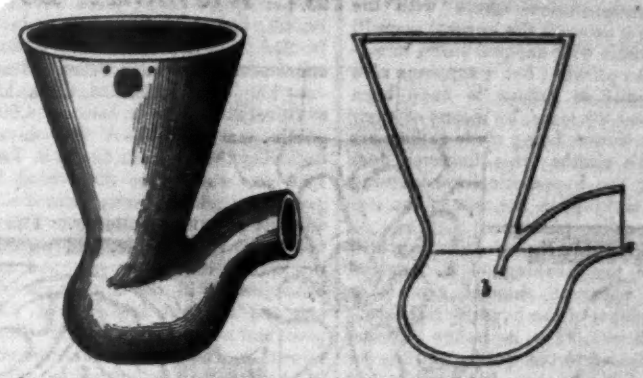
stone or wood. Large crockets and leaves cut of thin plate, and then twisted to the required form, presented all the richness of relief and undercutting. The lines of stems were engraved or fastened on. Large tracery was formed of rolled or bar iron, bent to the required shape, and rivetted together. But with all this apparent facility of execution, the difficulty of getting such works executed now is inconceivable. Though the process of casting itself requires some delicacy of manipulation, it would be difficult to find three workmen in England, who could at once produce any thing equalling the examples before us. The cost of the iron-work at the New Hall at Lincoln's-Inn was very great; in design and execution it certainly surpasses any thing that has been produced of late. The outside of the lock on the door of the council chamber, not so elaborate as that here represented, is said to have cost ten guineas.

The variety and beauty of the old keys is not less striking than are the locks. The handle was enriched with beautiful tracery, and even the wards were formed into devices, as that of the cross and the sacred monogram. At the same time, the convenient form for holding was seldom interfered with. In this example the tube and the wards are modern. The general arrangement of the circle with the handle, square in section, is frequently met with. The date of the key may be a little later than that of the lock. These examples are at present in the possession of Mr. Rogers, of Great Newport-street, to whom the writer is indebted for permission to draw them.

E. H.

*** Next week we shall be able to lay before our readers an engraving of another lock of different character.

CHEAP PAN FOR WATER-CLOSETS.



CHEAP WATER-CLOSETS.

The annexed engraving represents a water-closet pan, now being made in stone ware by Doulton and Watts, of Lambeth, which is well adapted for third and fourth-rate houses, where expense is an object, as it is both durable and cheap.

It will be observed, that the pan and water-trap (*b*) form one piece, and that it can be fitted with ease to a pipe drain. It is most desirable that no open privies should be constructed; and when it is found that the evils they entail can be avoided by a most trifling expenditure, there would seem to be no excuse for pursuing a contrary course.

SCAMILLI IMPARES.

An interpretation of an obscure passage of Vitruvius having lately appeared in the columns of The Builder (Curved lines of the Parthenon, p. 122), a different interpretation of the same passage may, perhaps, be interesting to some of its readers.

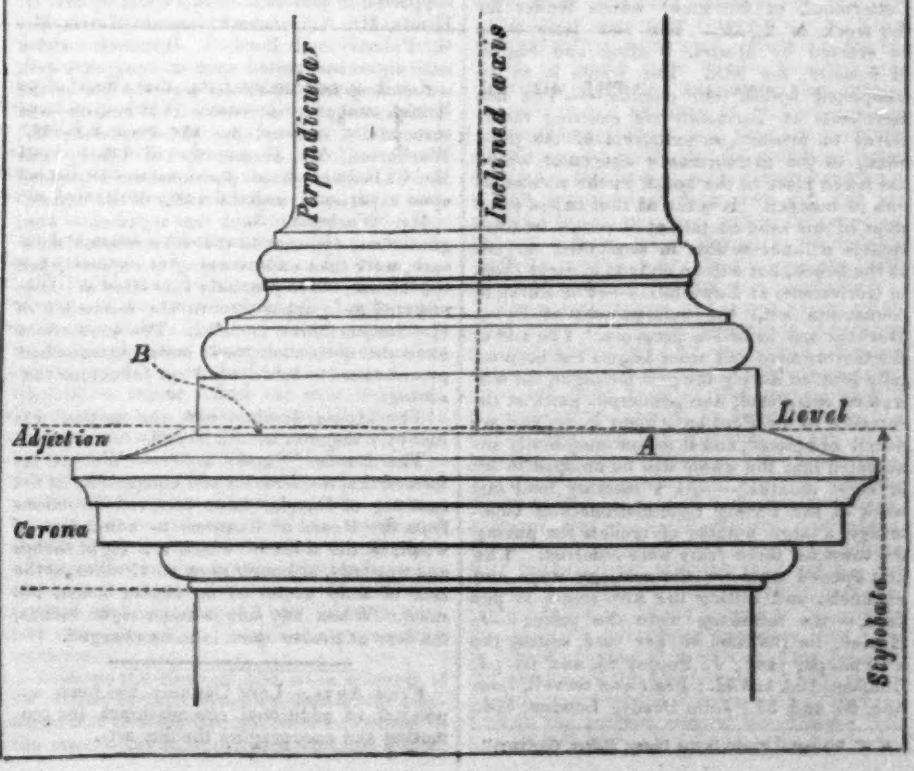
It must be premised, that Vitruvius directs that the axes of the columns at the flanks of temples should not be set perpendicular, but with an inclination inwards. In effecting this, the plinths, bases and capitals would be out of level. His object in the passage alluded to, was to shew a method by which the want of parallelism between the oblique lines of the bases, and the horizontal ones of the stylobatæ might be made least apparent; it is translated by Newton as follows:—"The stylobatæ should be wrought in such a manner as to leave in the middle, the adjection for the unequal scamilli; for if directed level, it will seem to the eye to be channelled. But the manner of properly forming these scamilli, will be shewn by the figure and description at the end of the book. This done, the bases are fixed in their places, and are so proportioned, that, including their plinths, they have in height, &c."

The meaning appears to be this, the stylobatæ, that is the parts above ground immediately under the columns, should be originally so wrought, that sufficient material should be left in the middle of the tops of them, to allow of their being subsequently pared down and shaped into what he calls unequal scamilli, that is footstools with unequal sides. The tops of these stools are not to be level, but are to agree with the oblique direction of the beds of the plinths, for if the tops of the stools were made level, the spaces between the bases and them, usually occupied by plinths, must be filled up with members of unequal sides, instead of plinths, which would appear to the unaccustomed eye like plinths partially sunk in the tops of the stylobatæ, and might themselves, from their position and form, be called with propriety unequal footstools.

The drawing referred to, was to shew how the sides of the scamilli (probably curved surfaces), might be best blended with the upper surfaces of the coronæ of the stylobatæ.

If the above conjecture be correct, the *scamilli impares* were members of the stylobatæ between their coronæ and the undersides of the plinths.

SCAMILLI IMPARES.



In a subsequent sentence, Vitruvius says, that a similar method should be adopted to make the tops of the capitals coincide with the architraves.

Newton's interpretation agrees with the above, so far as it assumes the unequal scamilli to have been stools with unequal sides, immediately below the plinths; but it supposes also an actual channel or groove to have been formed all round the sides, by means of their horizontal dimensions being made rather less than those of the plinths; this, however, does not account for the hypothetical eye-seeming channelling or sinking, in the tops of the stylobate of the puzzling passage.

The annexed roughly-sketched diagram will further explain my meaning:—A, unequal scamillus; B, apparent channel, groove, or glyph in the stylobat of the hypothetical case.

I have just heard, what is rather curious, that we are indebted to the word scamillus for one in the English language. It was adopted in the Anglo-Saxon as sceaniel, a stool or bench, whence an etymologist* derives our word shambles (butchers' benches or stalls).

J. P. W.

NOTES IN THE PROVINCES.

Her Majesty's Commissioners of Woods and Forests have determined upon adding considerably to the size of the Home Park, Windsor, by throwing into it the Maestricht Gardens, which run for half a mile parallel with the Thames at the western extremity of the park, and are of great width. The wall which separates the gardens from the park is now in course of being removed.——An official document has lately been gazetted, authorizing the conversion of the Episcopal Palace in the city of Worcester into a residence for the dean of that diocese.——Exertions are being made, and with every prospect of success, to obtain means to erect a church in Tangier, near Taunton.——The church of Blandford St. Mary, Wilts, was nearly destroyed by fire last week. The accident occurred from the pipe of the stove, which was put up through the roof adjoining the rafters, being burnt out. The rafters consequently took fire, and flames issued from the roof. The prompt assistance of the villagers, and a good supply of water, prevented the entire destruction of the edifice.——*Felix Farley's Bristol Journal* says: "A dissenting sect at Cardiff being about to erect a chapel, have advertised for plans, &c. The advertisement at the end says, that the committee will not 'feel bound to accept the lowest tender (or any).' The honester mode would have been for the committee to at once have stated that they wished all the information they could procure without paying any thing for it.——A contract for building the new sea wall and esplanade on Cromer beach has been accepted in favour of Messrs. Wright and Cattermoul, of Norwich, whose tender for the work is 2,323*l*. The new jetty is to be erected by Messrs. Witting and Smith, of Cromer, for 985*l*. The whole is to be completed within four months.——The fish merchants at Yarmouth are exerting themselves to procure an extension of the jetty, owing to the extraordinary alteration which has taken place in the beach by the accumulation of *manner*. It is feared that unless some steps of this kind be taken, in rough weather vessels will not be able to land their cargoes at the beach, but will be obliged to carry them to Gorlestone, or Lowestoft.——The works in connection with the enlargement of Dover Harbour are in active progress. The site of the Government old store-houses has been totally levelled during the past fortnight, the sea-wall is completed, the ponderous gates at the entrance to the Pent have been hung, and are nearly completed, and it is now confidently anticipated that the whole will be finished in six or eight months.——At a meeting held last week of the Paving Commissioners of Cambridge, a large number of tenders for paving the town for three years were received. The first opened were for the carriage ways and channels, and setting the kirb-stone, at per yard,—the following were the prices:—J. Hurley, for the road 9d. per yard, setting the kirb 6d. per yard; J. Popjoy 8d. and 6d.; J. Coulson, 10d. and 4d.; Pratt and Sewell, London, 8d. and 5d., John Brady, London, 5½d., or 2d. extra if grouted, and 3d. the kirb. For the flag-pavement, John Brady sent in a tender also, which was likewise considerably below his competitors, he proposed to execute it at 9d. per square yard; there were two others at 1s. 4d., one at 1s. 3½d., one at 1s. 3d., one at 1s. 2½d., and two at 1s. 1d. It was of course unanimously agreed to receive Brady's tender.——The corporation of Cork have applied to Government for a loan of 4,000*l*. to build public markets.——A few days since, in removing the floor of a house in Tavern-street, Ipswich, walls were discovered beneath the ground, which evidently formed some part of an Ecclesiastical building. The walls were constructed of rubble, and were about 2 feet thick, one extending east and west, and the other joining in the middle part on the north side and at right angles to it. There was a plain and narrow doorway in the first, and a larger doorway with mouldings characteristic of the fourteenth century in the other.——At the Suffolk adjourned sessions, on Monday last, Mr. Borton produced a plan approved of by a select committee, for a new bridge to be erected at Higham. The plan was generally approved of by the bench of magistrates, and is to be carried into effect forthwith.——A gentleman employed by the Government is now in the vicinity of Weymouth making arrangements of a preliminary nature, with a view to commencing the long talked of Portland Breakwater.——The coffer-dam in connection with the harbour improvements at Aberdeen is completed, and has proved perfectly watertight. Immense wooden beams traverse the whole length and breadth of the dam, which are intersected and supported by others in all directions, and in every possible manner; so that the tides, which have occasionally risen to the height of twenty-one feet outside the dam, have made no impression upon the work.——At a recent meeting of the town council at Coventry, a plan of the proposed cemetery was laid upon the table and approved of. It was determined by lot that the church should have the west and the dissenters the east side of the grounds, which extend over between seventeen and eighteen acres. The *Coventry Herald* says:—"Judging from the plan, the contemplated cemetery will in all respects do honour to the city, which will thus become distinguished by one feature consonant with modern taste, and with the spirit of 'sanatory reform.'"

* W. Barnes' "Poems in the Dorset dialect, Glossary."

THE TIMBER DUTIES.

This important subject has lately occupied much of the attention of the House of Commons, no doubt however exists respecting the issue of the proposed reduction by Government. The Marquis of Worcester headed an opposition, and was desirous of allowing the existing rates of duties to remain as they are. He was supported in a motion to this effect by Mr. H. Hinde, Mr. A. Chapman, Captain Harris, Mr. G. Palmer, and Lord G. Bentinck, whose only arguments rested upon an imaginary evil, which they said would be severely felt by the British shipping interest. The motion was successfully opposed by Mr. Cardwell, Mr. Warburton, Mr. Hume, Sir G. Clerk, and Mr. C. Buller, whose positions were founded upon experience, and the wants of the nation.

Mr. Warburton said the arguments hon. gentlemen opposed to the Government measure, were then endeavouring to impress upon the House, were precisely the same as those resorted to in opposition to the reduction of the timber duties in 1842. The predictions were also quite analogous; but experience had proved them to be founded on fallacious reasoning.

The House divided, and the motion was lost by a majority of 232 to 109.

The *Dundee Warder* says:—"We are informed that the director and comptroller of the customs at Dundee have received directions from the Board of Customs to admit logs of wood, all the sides of which are eight inches and upwards, although *sawn* on all sides, at the rate of duty as levied on timber *hewn*, not sawn. When any side is *under* eight inches, the duty as timber *sawn* is to be charged.

Fine Arts.—Lord Canning has been appointed an additional commissioner for promoting and encouraging the fine arts.

BRICKWORK IN LIVERPOOL.

Sir,—Some time back an article appeared in your journal, which has also gone the round of the newspapers, stating the extraordinary increase of houses in Liverpool in the present, compared with former years. This increase is truly astonishing, but at the same time it is a fact, that the manner in which the houses are put together is deplorable, the brickwork more especially, is of that description called jerrying, of which a similar specimen could scarcely be found in any other place. The method they have of bonding, if bonding it can be called, is with four stretching courses, and then a heading course; but the heading course is not always whole bricks, and often I have seen four half bricks for a two-brick wall, so that there would be a vertical joint in the middle of the wall for ten or twelve courses down, very seldom flushed up with mortar, and leaving a complete cavity in the wall for the mice from bottom to top. The other day I saw a warehouse on fire, and for four stories down from the top, the smoke was issuing from nearly every vertical joint in the front wall. I have also seen several buildings taken down for improvements, and these all display the same system of workmanship in every respect. It appears to have been the system here for ages back,—and it still continues, nor does there seem to be any desire on the part of the workmen to improve themselves, but they are content to plod on in the same slovenly way. This to me appears strange, when they have so many bricklayers from all parts of the country, yet they all get into the same system; and that spirit of emulation which should, and I believe formerly did exist amongst workmen, appears to have now become quite extinct.

I am, Sir, yours, &c., Wm. Hawley.
Liverpool, March 21, 1846.

*** These remarks, we are sorry to say, apply to brickwork in other places than Liverpool.

THE NEW BRITISH MUSEUM.

Sir,—The public press seems almost to have entered into a tacit compact to avoid the British Museum, so very studiously does it preserve silence in regard to the progress of that building. When the façade was first begun, there was a little squeaking, and protesting against the triviality and insipidity of the design adopted for one of the most important, certainly the most public, of all our public buildings;—a design in utter contradiction to the spirit which in the course of the last ten or twelve years has been infused into architecture. A decided movement forwards has been made in regard to the increased attention now bestowed upon architectural design and appearance, and that, not only for edifices of a superior class, but generally; not always, indeed, with the very best taste, but still aiming at taste and consulting appearance. The Museum certainly does not keep pace with, on the contrary, lags far behind such movement. In quality, its façade will be precisely of the same kind as that of the Post Office, as will be the design also: little more than a variation of the other, without a single fresh idea in it. Nay, there will not even be so much as any accompaniment of sculpture, though if any where at all, that would seem to be expressly called for in the façade of a museum, where it would be sufficiently significant and characteristic, and not altogether so decidedly contrary to the genius of Grecian architecture, but that it might for once be admitted into our Anglo-Grecian as a novelty,—an improvement on the Parthenon, which, as all who visit the Museum very well know, had no decoration of that kind whatever!

Pray heaven it be not by and by found out, *après le coup*, that a noble opportunity for securing a fine and finished specimen of Grecian architecture, one exhibiting our prowess in style as satisfactorily as the Houses of Parliament will do in a different one—has not been quite flung away and lost. The chief merit which the unlucky museum façade is likely to be able to claim, will be that of giving the *coup de grace* to Grecian architecture, and rendering us more Gothic in our affections than ever. An engraving in a contemporary journal shews what might yet be done towards redeeming

the design, and infusing into it a little more character and dignity; nor does there seem to be any positive necessity for continuing the roof or loftier portico over the part of the building behind it, the portico itself, according to the altered plan, being of such ample depth, that there would be sufficient extent of ridge of roof over it, to prevent the portico appearing merely stuck on to the edifice,—at least in any view of that side of the building.

BUDOWNIK.

DEVELOPMENT OF STYLES.

At a meeting of the Decorative Art Society, held on the 11th inst., a paper was read by Mr. Dwyer, setting forth "Ideas on the development of styles." The imitative faculties it was supposed would, in the earliest states of society, be directed to imprinting fanciful and grotesque devices on domestic implements, such being probably suggested by quaint formations of nature first selected and applied to those uses. Credulity in various ways would become attached to these forms; religious and moral precepts would be symbolized, and history, manners, and ceremonies thus registered. The striking similarities discernible in remains of primitive art found in Mexico, Egypt, and India afforded much matter for remark. He doubted the *practical* utility to designers of searching remotely for the origin of styles, beyond an endeavour to obtain a similar inspiration to that which the artist of an admired work had possessed; and which would be best approached by a consideration of the circumstances of the period at which it had been produced. He ascribed the remarkable difference in styles, generally classed as distinct, to the extensive influence of national and religious habits and feelings, and dwelt upon the great difficulties of defining where any style begins or ends. Warfare had conduced greatly to this confusion, while religion was always stimulating conventionalities. To recognize the beautiful is the soul of art, and it was contended that the difference between the works of the ancients and the moderns, arose from a more immediate attention to natural types on their part, while we have been preferring to imitate the examples left to us of their skill. Several portions of Egyptian, Greek, and Roman decorative art, derivable from vegetable and animate forms were enumerated, alluding also to the symbolical meaning with which most ornaments had been invested, and which, it was argued, ought to be more strictly regarded in the adoption for modern purposes. The lecturer exhibited chalk drawings, one of a capital to a column, designed by himself from the water-cress; others illustrated the beautiful forms which the congelation on our windows assume in frosty weather; and one of the common nettle in blossom, in an inverted position, afforded a type for a chandelier. He said that he did not advocate servility in copying natural products, but contended that ideality ought to imbue all designs for embellishments. He would especially desire to see in our schools for artists, copies from ancient works placed beside the natural archetype from which they were designed, so that the *ideal* might be more correctly appreciated; and he concluded his paper with some remarks upon geometry and proportion, as being essential to the best arrangements of the best ideas.

AMIENS CATHEDRAL.—The *Literary Gazette* says:—Thoughts had been entertained some time ago that it would be possible to restore some of the sculptured figures of Amiens Cathedral which had been greatly mutilated, especially on the outside; but the Government commissioners, Messrs. Dusevel and Goze, appointed to examine the cathedral for this purpose, have reported that it would be much better to leave the figures untouched, and only to prevent them from receiving further injury. The general character of the collection of sculptures would then be better preserved than by any modern attempts at imitation. Two icnographical curiosities have been pointed out by these gentlemen as occurring amongst the figures. One is that of the Father holding the world on the end of a finger; the other that of the Holy Ghost represented as a human being seated, and holding the dove on his knee; while the Father and the Son are supporting the symbolical triangle.

OXFORD ARCHITECTURAL SOCIETY.

A MEETING was held in the Society's Room, Holywell, on the 11th inst. The president having announced the presents received, Mr. Millard, hon. sec., proceeded to read the report of the committee, which contained the following:—"The chief matter of interest which the committee has to report is, as usual, the progress of the works at Dorchester. The great south window and the beautiful sedilia, which, together form the portion already contracted for, are now on the verge of completion. The state of the restoration fund is more promising than at the last meeting of the society, for their subscriptions having been received since that time, from the Archbishop of York, the Bishop of the diocese, General Burrows (the patron of the living), and others, these contributions have completed the sum necessary for the second contract, and two members of the society have readily undertaken the responsibility of signing it. No delay will therefore be occasioned by a want of funds for the present; and the committee will immediately put in progress the restoration of the east and Jesse windows, with a portion of the roof of the chancel. In restoring the great east window, an original design will be necessary for the tracery in the rose; and that this somewhat difficult task may be satisfactorily accomplished, the committee believe it will be necessary to call in the assistance of another architect."

Mr. Guy, of Lincoln College, read a paper on the "Architecture of Howden Church, Yorkshire," illustrated by a number of drawings and engravings.

STRIKE IN THE BUILDING TRADES.

THE whole of the building trades of Manchester have turned out, in some instances for an advance in wages, and in others for an abridgment of the hours of labour. The numbers at present out of employ are roughly stated to be as follows:—

Carpenters and Joiners.....	1,700
Bricklayers	300
Bricklayers' labourers	400
Plasterers	200
Slaters	130
Labourers to two last	300
Painters.....	150
Plumbers and Glaziers	200

The carpenters and joiners of Leeds have given notice of their intention to strike on the 6th of April unless their wages are advanced 2s. per week. At Birkenhead upwards of 1,000 stone masons, carpenters, &c., have struck for an advance from 23s. to 27s. per week. Similar strikes are anticipated at Liverpool, Kendal, Scarborough, and other places. The employers at Manchester have formed themselves into an association for the purpose of protecting themselves from the demands of their workmen. They have caused large posters to be displayed throughout the metropolis, announcing that 4,000 mechanics, belonging to the undermentioned branches in the building trades, were wanted immediately at the following wages, in Manchester and the neighbourhood:—Carpenters and joiners, 28s. per week; bricklayers, 30s. per week; plumbers, 27s. per week; slaters, 26s. per week; plasterers and painters, 26s. per week; and labourers, 18s. per week.

The *Manchester Guardian* states broadly that "a few individuals at the head of the trades' union rule them, and dictate imperiously in all things, when they shall work and when strike, what wages they shall demand, and what offers refuse. Still the best workmen, the most intelligent men, are mainly disposed to accept the offer of the masters, giving them an advance of two shillings, with a return to the old hours. But the union overawes and prevents them from resuming work. It may be asked how men can continue under such thraldom; but the union finds a firm phalanx of supporters in the inferior workmen, many of whom are seldom fully employed, and being a numerous body, they aid the union to overawe and coerce into compliance the superior workmen."

Towards the close of last week upwards of 1,100 railway labourers, employed on the Lancaster and Carlisle line struck work, owing to the contractors having issued a printed notice, intimating that from and after Monday last, the men were to work 10½ hours per day, exclusive of meal times, the time previously being 10 hours a day.

MATHEMATICS FOR ARCHITECTS.

IT cannot be denied, that the kindred professions of architecture and engineering require to be based upon principles in pure mathematics; still less can it be denied that the professors themselves are *in general* but little versed in that essential branch of their respective professions. In fact, we can scarcely take up a professional book, in which there is the slightest approach to mathematics, without feeling convinced that the author is handling unfamiliar tools, and often lacerating his professional character by his clumsy use of them. Often have we felt a suffusion of shame when consulting works of the most eminent men in these professions, and stumbling on their ludicrous attempts to talk mathematically; and we have felt pleased in thinking that such *jejune* productions do not fall under the eyes of mathematicians. They know too well that our professional works contain nothing calculated to repay the trouble of perusal, much less the expense of purchase.

Yet problems of great, very great mathematical difficulty, are daily occurring in both professions. What is the consequence? That our architects and engineers are compelled to trust to unsatisfactory and illusive experiments with models, or to risk at once the consequences of their conjectural designs. They sometimes succeed—*often* when they keep pretty close to older and tried plans; but occasionally the most lamentable failures take place, and sometimes attended with fearful loss of life as well as property. A moderate portion of mathematical skill would have prevented these and other evils.

Again, the unnecessary strength given to parts of a structure, and unnecessary demand of generative power in machines, are so common, that there are perhaps few buildings or machines at present in existence, which form entire exceptions to the charge. Now the strength of a structure is, in reality, the strength of its weakest part, and even the weakest part may be weakened still more by its connection with the other parts; and the power of a machine is only that part of the initial force which is effectively conveyed to the "working points." All else is wasted, whether of strength or power; and, in fact, so much capital might as well be thrown into the ocean at once, as employed in these unprofitable parts of a structure or an engine.

A competent knowledge of mathematical science would enable the professional man, *in a very great degree*, to avoid this profusion of expenditure, and in nearly every case to prevent those frightful catastrophes that are periodically occurring from falling buildings and exploding machinery. Even on the inquests to which these terrible fatalities give rise, the conflicting and often very absurd testimonies and opinions of professional men are most remarkable; and they are gradually convincing the public that the professors themselves are destitute of all accurate knowledge of the *principles* of their own art, and are guided by mere empirical rules, the slightest departure from which becomes professional temerity, and a most wanton sporting with property and life! Is this as it should be?

Were architecture and engineering empirical arts—were it not possible to determine *à priori* the results of all strains and pressures in a building, and the loss of power attendant upon any given train of machinery—were it not possible to compute, by unerring rules, the actual force and its direction at any given point, either of a structure or a machine—then, indeed, this reproach could not lie at the door of either profession or of its Institute. Since, however, *they need not be* empirical professions, and as a comparatively moderate acquaintance with mathematical science would redress the greater part of the wrongs which professional ignorance inflicts on the public, it behoves us to make such corrections ourselves, lest they be forced upon us in a more galling form by the decision of the legislature. In fact, as any person, no matter his ignorance of all that relates to the subject, may at his pleasure dub himself "C. E." or "Architect," and as in the

recent railway mania, so many of the most unprincipled and unpractised persons have thrown themselves into the engineering profession, we need not wonder, nor indeed should we be sorry to see it, if the legislature should find it necessary to exercise a control such as it does in *law* and *medicine*. It certainly does seem necessary to put some restrictions upon the power of incompetent persons to enter these professions; and no mode seems so practicable as a charter of incorporation and a board of examiners to decide upon the qualifications of candidates in each of the professions. We are sure it would be a boon to the public, and not less a boon to the professions themselves. It would secure to the public qualified artists; it would remove from the professions that load of discredit which the present open system inevitably entails upon them, and with increasing accumulation each successive year.

We scarcely, however, hope to see this desired consummation yet; but we do know, from many letters which we have received, that a great number of the younger members of both professions are anxiously desiring to *qualify themselves* for an efficient and honourable execution of their duties. We have often been requested to point out a suitable course of study and reading in mathematics, which shall mainly, if not wholly, have a direct professional bearing — including all the great features of what is essential, and precluding those inquiries which, however interesting to professional mathematicians, are superfluous to professional architects and engineers. Yielding to none in our wishes to be "useful in our day and generation," we shall attempt to point out, not only the subjects, but the manner of study which appear to us to be best adapted to the end in view; and we trust that should the day come—which we yet hope to see—when some test of capability for professional duties shall be rendered legally imperative, the suggestions which we may offer will have proved a beneficial aid to many a one qualifying himself, who would otherwise have been unable to do so, in that most important branch of his acquirements, the *mathematical*.

Although large premiums are paid with articled pupils both to architects and engineers, we believe there is not a single case producible, in which the slightest attention to mathematical studies is included in the course of professional instruction. How, indeed, should there be? The youth may be advised, or he may not be, "to get a few lessons in mathematics from some private teacher;" but in most cases the advice will be looked upon as a bore, and perhaps given with a half sneer; and even if adopted, he is left, like his tutor, in the dark as to the nature and character of the mathematics that he wants. He blunders through a few lessons, gets disgusted, and his mathematical course is finished with the payment of his first guinea!—*Mechanics' Magazine*.

WESTMINSTER COURT OF SEWERS.

On Friday the 20th inst., a court was held. Mr. Leslie in the chair. After the minutes of several preceding courts had been read, in which it appeared the surplus from the rates of 1845, applicable to the year 1846, was 10,243*l*. 18s. 6d., the solicitor to the court made an application for petitions to Parliament against the Windsor Railway, and Surrey Grand Junction Railway Bills, which were in consequence then duly signed by order of court.

The solicitor also presented a report upon the dangers likely to arise to the district, from the weakened state of the banks of the Kensington canal. The court ordered a special court to be held on Friday, the 27th instant, to sign a precept to the sheriff for a jury, to consider by whose default the evils pointed out had arisen, and to amerce the parties for their neglect; notice to be given to all parties interested of the said special court.

The first office clerk, Mr. Hatton's, salary was increased 50*l*. per annum, on account of his general good conduct and attention to his duties. The consideration of Mr. Doull's memorial for a pension, was postponed to the next ordinary meeting of the court, the subject to be then discussed on the motion of Mr. Cumberlege and Mr. Godrich, that he be allowed a year's salary on account of the abolition of his office as accountant-surveyor.

At this court, the new chief surveyor presented five special reports with several drawings, one of which to accompany the general instructions to applicants for building sewers, gullies, side entrances, elicited the approbation of the court, and was ordered to be engraved forthwith.

INSTITUTION OF CIVIL ENGINEERS.

Tuesday, March 24th, 1846, Sir John Rennie, President, in the chair.

The paper read was by Mr. W. Parks, describing the "Estuary of the River Severn." After giving a brief account of the Severn above Gloucester, the paper proceeded to describe the character of the river at Longney Point, about ten miles below Gloucester, where it becomes a tidal estuary, and where the most important circumstance to be taken into consideration as regards navigation, is the rise of the tide. Below Longney, the river becomes broad and shallow, and at low water presents an extensive series of shoals composed of mud and sand. The stream there is rapid, and the general fall of the surface is much increased. This lower portion of the Severn forms a great natural weir, which the shipping avoid by taking the Berkeley Ship Canal.

Viewed in reference to its tides, that portion of the river might be considered as part of the Bristol Channel, for it is from the the funnel-shaped form of that arm of the sea that it derives its facilities for navigation; in consequence of this form, the water running up is, as it were, choked by the downward current and is raised above its sea level, thus the lift of a high tide at Kingroad is 47 feet, at the Old Passage it is 45 feet, at Chepston 37 feet 10 inches, and at Beachley 40 feet 6 inches. At this latter point is situated the Old or Aust passage on the main road from Bristol to Wales. The channel for navigation and the main set of the tide is close to the North or Beachley shore. The flood-tide flows at about 6½ miles an hour, and lasts 4½ hours, the ebb 7½ hours. Small vessels are enabled to pass up at 1½ hour after flood-tide commences; larger vessels soon after half flood, and reach Sharpness Point, the entrance of the Gloucester and Berkeley Canal before high water. Above Sharpness Point, the river at low water presents an immense extent of sandy and muddy shoals for five miles. Here is first observed the curious phenomenon called the "Bore." The impetuosity with which the two currents meet, and the shallowness of the low water channel, cause an almost vertical rise of 2 feet or 3 feet and sometimes 5 feet, extending across the river and varying its velocity as it passes over deep or shallow water.

The paper then proceeded to notice the capabilities of the lower part of the Severn for improvements, and stated that one of the improvements of which it was susceptible was cutting a canal across the neck of land from Framilode to Hock Crib, which would much facilitate the downward trade by effecting a saving of two tides to vessels sailing in that direction. Any general scheme of improvements was scarcely practicable, as if the natural impediments in the lower part of the river were removed, the effect might be to nearly drain the upper portion. Still, since local alterations might be advantageously made, and the navigation would be facilitated, the author seized the opportunity of suggesting the advantages of having one standard height as an uniform datum line all round the coasts of Great Britain, to which standard all levels should refer. In the discussion which ensued the importance of the subject appeared to be generally admitted, and the good example given by the author in communicating to the Institution the observations made during the course of his survey of a portion of the river for Mr. Walker, was particulary eulogized.

Interment in Towns.—Mr. Mackinnon gave notice, that on Thursday, the 2nd of April, he would move to renew his bill for the prevention of interments in the neighbourhood of large towns. Mr. Walker has presented a petition.

The Royal Literary Fund.—Mr. J. Newman, F.S.A., is appointed honorary architect, in the room of the late Mr. Rhodes, who held the appointment forty years.

BUILDINGS ACT AMENDMENT BILL.

This bill has received the royal assent, and is now part of the law of the land. The egregious blunder in it, pointed out last week, was *not altered*, but goes to increase the sum of errors and inconsistences which disfigure the Act as a whole.

Miscellanea.

Condition of Labourers' Cottages.—The spread of those evils which the working classes unhappily too much indulge in are, in a great measure, ascribed to their uncomfortable dwelling at home. In Berkshire, Mr. Parker, in Mr. Chadwick's "Sanatory Report," observes that "the floors of the cottages are laid with red tiles called 'flats,' or with bricks of a remarkably porous quality; and as each of these tiles or bricks will absorb half a pint of water, so do they become the means by which vapour is generated. The cleanly housewife, who prides herself upon the neat and fresh appearance of her cottage, pours several pails of water upon the floor, and when she has completed her task with the besom, she proceeds to remove with a mop or flannel so much of the water as the bricks have not absorbed. After having cleansed the cottage, the fire is usually made up to prepare the evening meal, and vapour is created by the action of the heat on the saturated floor. Thus the means adopted to purify the apartment are equally as injurious to the health of the inmates as the filth and dirt, frequently too abundant in the cottages of labouring persons." In the adjoining county, Buckinghamshire, Mr. Parker observes, the construction of the cottages is frequently unwholesome. He says, "the improper materials of which cottages are here built, and their defective construction, are also the frequent cause of the serious indisposition of the inmates. Next to good drainage and thorough ventilation, the foundation of a cottage is the most important consideration."

Sale of Land at Birkenhead.—The immense sale of land at Birkenhead, consisting of nearly 1,000 plots for building purposes, belonging to Mr. William Jackson, took place yesterday afternoon, at the Woodside Hotel. It was most respectably and numerously attended, the large room being crowded throughout to excess. About half-past 1 o'clock the auctioneer, Mr. F. Hodgson, commenced the business by reading the printed conditions, after which lot 1 was put up. It consisted of 16,022 square yards of land, situated in Slatey-road and Euston-grove, divided into twelve lots, the purchaser to have the option of taking two lots on the whole. Mr. Robert Hughes put up the lot at 7s., and the bidding was run up to 8s., at which price Mr. Hughes became the purchaser of two lots. The sale then went on, and eventually about twenty lots were sold for upwards of 7,000*l*., the prices ranging between 8s. 6d. and 26s. per yard, most, however, of it being situate in the outskirts of the town.—*Liverpool Courier*.

The Value of Smoke.—A striking instance of economic talent came to our knowledge, in the district of Alston Moor. From the smelting hearths of one "house," an arched tunnel conducts the smoke to an outlet, at a distance from the works, in a waste spot, where no one can complain of it. The gathering matter or "*fume*," resulting from the passage of the smoke, is annually submitted to a process, by which it had at that time yielded lead enough to pay for the construction of a chimney. A similar tunnel chimney, three miles in length, was erecting at Allendale. Its *fume* will yield thousands of pounds sterling per annum! Truly, here it may be said that smoke does not end in smoke.—*British Quarterly Review*.

Parish Churches.*—Under this title, Messrs. Brandon, whose valuable "Analysis of Gothick Architecture" is now nearly completed, have commenced a work which promises to be useful, being perspective views of English ecclesiastical structures in lithography with plans to a uniform scale, and brief description. The first number contains a view and plan of seven churches at an almost nominal price.

* Published by Geo. Bell, Fleet-street, and by the authors, Beaufort-buildings, Strand.

LARGE SALE OF SCOTCH FIR TREES.—A portion of Novar Forest, Ross-shire, consisting of 10,032 Scotch fir trees, was sold on the 24th ult. by Mr. Munro, of Novar. The price realised was 5,704*l.*, or on an average of 10s. 1¾d. per tree. One lot of 1,248 trees brought 1,010*l.*; and some of the trees brought 2*l.* each.

TRANSFER OF LAND.—The *Westminster Review* for March has a valuable article on this important subject, explaining the cause which now impedes the alienation of real property, and giving a detailed plan for its removal. It well deserves attentive consideration.

MEETINGS OF SCIENTIFIC BODIES

During the ensuing week.

MONDAY, March 30. — Chemical (Society of Arts,) Adelphi, 8 P.M.

TUESDAY, 31. — Civil Engineers, 25, Great George-street, 8 P.M.; Syro-Egyptian, 71, Mortimer-street, Cavendish-square, 8 P.M.

WEDNESDAY, April 1.—Society of Arts, Adelphi, 8 P.M.; British Archæological Association (Western Literary Institution), Leicester-square, 8½ P.M.

THURSDAY, 2. — Royal, Somerset House, 8½ P.M.; Antiquaries, Somerset House, 8 P.M.

FRIDAY, 3. — Royal Institution, Albemarle-street, 8½ P.M.; Botanical, 20, Bedford-street, Covent Garden, 8 P.M.

SATURDAY, 4.—Asiatic, 14, Grafton-street, 2 P.M.

Tender.

For the erection of the Paddington parish workhouse.

W. Higgs	£17,500
Jay	16,973
Crooke	15,459
Gerry	15,328
Cooper and Davis	14,947
Hawke	14,931
King	14,654
Barr	14,384
Jas. Davis	14,300
Smith	14,100
Shikins	14,098
H. W. Cooper	14,094
Higgs and Son	13,899
Wilson	13,894
Holman	13,784
Burton	13,771

NOTICES OF CONTRACTS.

[We are compelled by the interference of the Stamp Office to omit the names of the parties to whom tenders, &c., are to be addressed. For the convenience of our readers, however, they are entered in a book, and may be seen on application at the office of "The Builder," 2, York-street, Covent-garden.]

For the execution of the several works connected with the re-erection of a timber-bridge, near Colnbrook, Middlesex.

For making and erecting four turn tables of 22 feet diameter each, for the Great Southern and Western Railway (Ireland).

For pulling down and rebuilding the parish church of South Fambridge, near Rochford, Essex.

For executing the repairs of the chancel of Saint Mary's church, Bury St. Edmunds, Suffolk.

For the construction of the various stations and buildings required on the Hull and Bridlington Railway.

For the erection of the South Staffordshire General Hospital.

For the erection of the station-houses and gate-lodges on the Lynn and Dereham Railway.

For the execution of works on the Waterford and Limerick Railway, and for supplying the same with 50,000 sleepers.

For the erection of station-houses and gate-lodges upon contract No. 1, on the Lynn and Ely Railway.

For the maintenance of the permanent way between the Derby, Nottingham, and Rugby Stations, on the Midland Railway.

COMPETITIONS.

The directors of the Church of England cemetery, Birmingham, are ready to receive designs for the laying out and ornamenting their grounds at Warstone, and also for the erection of a chapel, entrance-lodge, &c. Buildings in the Saxon or Gothic styles will be preferred. A premium of twenty guineas will be given for the design most approved of, and one of ten guineas for the second.

The directors of the Gravesend and Milton Water Works Company offer a premium of thirty pounds for the most approved plan for laying out for building purposes about sixteen acres of land, forming the whole of the south side of Windmill-hill, Milton, next Gravesend. A further premium of ten pounds will be awarded to the second best plan.

It is proposed to build a town-hall at Luton, Bedfordshire, with dwelling-houses and shops adjoining. No premiums are offered for the best designs sent in, but "the architect whose plan is adopted will be required to superintend the work if an arrangement can be made to that effect."

APPROACHING SALES OF WOOD, &c.

BY AUCTION.

At the White Horse Inn, Romsey, Hants: upwards of 3,000 superior oak timber trees, chiefly from 15 to 60 feet metings.

At the Hunloke Arms Inn, Wingerworth, Derby: about 200 valuable oak, ash, and elm timber trees.

At the Crown Inn, Rayleigh, Essex: 341 oak timber trees now standing.

At the Boot Inn, Aberdare, Glamorgan: 530 maiden oak and ash timber trees of good quality and dimensions.

Upon the estate of Osmond Clarke, Esq., Stuston, Suffolk: about 40 loads of superior seasoned oak timber trees.

Upon the Mayland Hall Estate, Essex, by order of the governors of St. Bartholomew's Hospital: a large fall of elm timber.

At Eling, Wiltshire: about 1,000 oak trees now standing.

At the Anchor tavern, Westorchard, Coventry: 506 superior oak coppice timber trees.

Upon the Alton Hall Estate, Stutton, Ipswich: 216 oak, ash, and elm timber trees, 300 ash and elm stands, &c.

At Aldeby, Norfolk: 120 oak, 80 ash, 130 elm timber trees, now growing.

TO CORRESPONDENTS.

"W. N. R."—*Nothing has transpired this session about Lord Lincoln's Drainage Bill. It is expected that it will be brought forward immediately after the Easter holidays.*

"A Subscriber" (Notting Hill.)—*The names of the engineers and mill-makers of the metropolis will be found in the "Post-office Directory."*

"G. T." *shall not be neglected.*

"Constant Reader."—*Mere innuendo is not sufficient.*

"J. J."—*The note has been forwarded to Mr. P.*

"C. O."—*Candidates for admission as associates of the Institution of Civil Engineers, must be proposed by at least four members and two associates, who must certify to a personal knowledge of the party proposed. Full instructions with form of certificate can be had at the Institution on application.*

"F. B."—*We find it difficult to advise within the limits of a notice. Strain a point, and get a good instructor for a short time.*

"G. W. N."—200*l.* *would build a small six-roomed house.*

"A Young Beginner" *complains of the publication of tenders shewing great differences. Our sole motive is to induce builders to consider their own interests, and look before they leap. What will our correspondent say to the following tenders for alterations in a public-house, Kensington:—*

Collins, Kensington	£485
Loveland, do.	410
West, Church-street, Chelsea	397
Chippett, Charles-street, Chelsea	263!

"Very Constant Reader."—*The surveyor if employed by the tradesman, should have sent the account when written out, to the latter, so that he might copy before delivering it. If the surveyor omitted to do this, he should supply a copy.*

"Bridge-builder," "Brick-maker," *shall appear.*

Received: "B. B.," "M. B.," "J. L.," "Carbon."

ADVERTISEMENTS.

TO CIVIL ENGINEERS, SURVEYORS, &c.

HENRY POPE, Wholesale Stationer, having had for some time a large stock of Drawing Paper on hand, which, from its age, is so superior for mounting, feels much confidence in recommending his Mounted Papers, lengths of which upon linen and cotton are kept always ready. Maker of the Patent Metallic Levelling and Surveying Field Books, Tracing Papers, and all kinds of Stationery. The Ordnance Maps supplied. 22, Budge-row, Watling-street.

LITHOGRAPHY.

MESSRS. MACLURE, MACDONALD, and MACGREGOR, General Lithographers, beg to call attention to a peculiar feature in their system of conducting business; namely, their having a large and permanent staff of Assistants, in all the varied departments of the Art, on the premises; which arrangement, they submit, gives a force and effect to immediate production unattainable by other means, and which is obviously of great advantage to those who may require their services, independent altogether of the excellency of their work.

London Establishment, Savile House, 6, Leicester-square; Liverpool Establishment, 18, Fenwick-street; Glasgow Establishment, 57, Buchanan-street.

Vacancies for two Pupils; one in the Writing, the other in the Artistical Department.

TO BUILDERS AND CARPENTERS.

A Considerable saving will be effected in the purchase of IRONMONGERY, by applying at F. B. WILLIAMSON'S Wholesale Warehouse, No. 35, Chiswell-street, Finsbury-square, near Whitbread's Brewery.

Best Patent Cut Clasp.

2d.	4d.	6d.	8d.	10d.	20s.
6d.	7½d.	9½d.	1s. 1d.	1s. 6d.	2s. 3d. per 1000.

Best Sheet Floor Brads 10s. 6d. per cwt.

Best Town Gins 44s. per cwt. Do. Scotch 34s. per cwt.

Best Patent Sash Line.

1	2	3	4	5	6
4s. 3d.	5s.	6s. 6d.	7s. 6d.	10s.	12s. per gross.

Elliptic Stoves, 3d. per inch. Registers, 6d., 7d., 9d. per inch.

Self-acting Kitchen Ranges with Oven and Back Boiler.

Wrought Bars and Bright Fittings.

2 ft., 2l. 2s.	2 ft. 6 in., 2l. 12s. 6d.	4 ft., 4l.

Lists of Prices had on application at the Warehouse; if by letter prepaid, inclosing postage stamp.

IRON-WORK FOR BAKERS' OVENS.

F. A. TIDDEMAN, Purfleet Wharf, Earl-street, Blackfriars, keeps an assortment of Stocks, or Mouth-pieces; Plates, Furnace-bars, Top and Fall Pieces, Stoppers, Chimney-bars, Inside, Outside, and Ashpit, Doors and Frames, Boilers and Frames, Lamps, &c. &c.; all of the best description, at very moderate prices. —CAST-IRON UPSETS.

HENDRY and GLOVER, IRON-FOUNDERS, beg to inform their customers that they have removed their Foundry (from Smart's-buildings) to CHARLES-STREET and 160, DRURY-LANE, where they have adopted every improvement to enable them to compete successfully in quality, price, and punctuality. They have also an extensive and well-arranged stock of patterns for every description of Castings.

IRON BRIDGES AND PIERS.

THE Economy and Safety of DREDGE'S PATENT PRINCIPLE are explained in the "Mechanic's Magazine" No. 1172, and practically proved in Fifteen Public Bridges in Great Britain alone, four of which are Country Bridges for Common Road Traffic, varying from 50 to 204 feet in length. The continual destruction of Bridges and Viaducts is owing to an error of principle in their construction which is this. The line of equal horizontal thrust or pressure, both in suspension and compression bridges, should be sustained by the roadway, and not by the arch, as it universally is in the old systems; and hence the cost, the undulation and oscillation, and destruction of bridges are enormous.

Bath, Feb. 1846.

TO ARCHITECTS AND BUILDERS.

COLLINGE'S PATENT HINGES.—Sole Manufactory, 64, BRIDGE-ROAD, LAMBETH, where a great variety are always on view, for Church, Park, Coach-house, and all other Doors and Gates, of large or small dimensions, a gate of a ton in weight moving with these hinges as easily as a wicket; they are also admirably adapted for drawing-rooms, being highly ornamental, and folding-doors fitted with them may be removed and replaced in an instant. Rising and spring Hinges, on the most improved principle, and very superior Fastenings for exterior Gates, at moderate prices. To be seen at Charles Collinge and Co's Patent Axletree, Sugar-mill and Spherical-hinge Manufactory, 64, Bridge-road, Lambeth.

HOUSE-PAINTING, Interior Decorations, &c., executed in the best style, and on the lowest terms, by BENHAM and Co. (late Saunders), 170, Regent-street.—Estimates given if required.

PAPER HANGINGS. — A Stock of 50,000 Pieces always ready, in Satins, Flocks, Gold, Damasks, Oaks, Granite, Hand Marbles, &c. &c., at extraordinary prices. Terms, Cash.—Paper Stainers supplied with long Elephant at Mill Prices—Cash.—LESCHALLAS, 32, Budge-row, City, corner of Size-lane.

GRAINING AND WRITING FOR THE TRADE.

MESSRS. WOOD AND COMPANY, Grainers and Writers to the Trade only, by contract, measure, or otherwise.

Offices, 11, St. Benet-place, Gracechurch-street, City, and 62, Waterloo Bridge-road. All letters post paid.

N.B. Workmen sent to any part of the kingdom.

FIRE BRICKS.

W. WARD, Honduras Wharf, Bank-side, and St. Michael's-alley, Cornhill, has just landed a large quantity of his very superior manufactured Fire Bricks, of Stourbridge, Welsh, and Newcastle. Prices very low. Shipments made for the East and West Indies, &c., with the greatest promptness. Gas companies, engineers, builders, and all large consumers supplied from ships in the river at a much lower price. A very large stock on hand of Bricks, Lumps, Tiles, and Clays.

River sand and gravel by freight to any wharf and dock.

BRICK MACHINE.

JONES'S PATENT MACHINE is acknowledged by old-experienced workmen to turn out far superior Bricks to what can possibly be done by hand. Expedition and cheapness guaranteed. They are moulded stiffer, put in the walls at once to dry, and will bear two high a day. So that nearly double the quantity is in process of drying, and consequently less covering required. Contracts for brick-making, by machines, entered into, and licenses granted.—Apply to EDW. JONES, Queen's Wharf, King's-road, Camden Town.

STREET PAVING.—TO CONTRACTORS AND OTHERS.

THE ADVERTISER has invented a new PAVING for streets, which will entirely supersede the use of wood. It can be laid down with great rapidity, and will not need the stoppage of the whole street; it is very durable and free from dirt or dust, is never slippy, always presenting to the horse a firm footing, is as easy of draught as wood, and as free from noise; will cause an immense saving, as it can be laid down for a mere trifle. Any one wishing to join in patenting the article, or for purchasing the same, for further particulars apply by letter, post paid, to D. W., 1, Field-terrace, Battle-bridge.

ATKINSON'S CEMENT.—The public is respectfully informed, that the price of this very excellent Cement, which has now been in use for Architectural and Engineering works upwards of thirty years, is reduced to 2s. 2d. per bushel, and may be had in any quantity at Wyatt, Parker, and Co.'s Wharf, Holland-street, Surrey side of Blackfriars-bridge.

N.B.—This Cement being of a light colour, requires no artificial colouring or painting, and may be used for stucco with three parts its own quantity of sand.

PORTLAND CEMENT does not vegetate, requires no colouring, is perfectly hydraulic, and resists the action of Frost. The cost of the material and of working it is about the same as Atkinson's Cement, Manufactured by J. B. WHITE and SONS, Millbank-street, Westminster, and sold at their Warehouses:—

Druce's Wharf, Chelsea,
Bell's Wharf, Paddington,
Earl-street, Blackfriars,
Albion Wharf, Deptford-bridge,
by Salmon and Co., Dublin,
and at 36, Seel-street, Liverpool.

KEENE'S PATENT MARBLE CEMENT.

WITHOUT noticing CAUTIONS, which are as absurd as they are uncalled for, or disproving assertions, which carry with them their own refutation, the patentees of KEENE'S CEMENT venture to believe, that this material will very advantageously stand the test of comparison with any cement of a similar nature, however INVALUABLE, now before the public. They derive this opinion from its all but exclusive use in the new buildings north of Hyde-park, on the Brompton estate, and in many other public and private edifices, both in London and the country. Amongst others may be mentioned the works recently executed at the Colosseum, Regent's-park, where its hardness and beauty of appearance have caused it to be extensively used for skirting and other mouldings, in place of wood, for columns instead of marble, and as a substitute for stone in paving the floors of the corridors and conservatories.

Patentees and manufacturers, J. B. WHITE & SONS, Millbank-street, Westminster,

MARTIN'S FIRE-PROOF AND ORNAMENTAL CEMENT.

CAUTION.—Messrs. STEVENS and SON, Patentees, beg to caution their friends and the trade generally against confounding this invaluable Cement with others, erroneously said to be of the same description. S. and S. pledge themselves, that MARTIN'S CEMENT is totally dissimilar in composition and manufacture from every other, and, being a neutral compound, is not only free from chemical agency upon any substance with which it may come in contact, but completely resists the action of the strongest acids. They feel it a duty to direct attention to the following properties, which it exclusively possesses:—

1. It rapidly acquires the hardness of stone.
2. Unlike other internal cements, its hardness is uniform throughout its entire thickness.
3. Its surface (which may be made equal to that of the finest marble) NEVER THROWS OUT ANY SALT, and will receive paint in four days, without peeling, when put upon dry work.

It is peculiarly adapted as an internal stucco for walls, skirtings, architraves, mouldings, and enrichments of all kinds, to all of which purposes it has been extensively applied by Mr. Thomas Cubitt on the Grosvenor estate, &c.

For the above purposes, it possesses great advantages over wood, being more economical and durable, resisting fire, damp, and vermin.

For the floors of hall and fire-proof warehouses, its lightness, durability, and uniform surface give it an immense advantage over stone, being, at the same time, much more economical. The most satisfactory references can be given. To be had of the Patentees, Plaster of Paris and Cement Manufacturers, 186, DRURY LANE.

Agent for Liverpool and Manchester, Mr. R. PART, 28, Canning-place, Liverpool.

TO ARCHITECTS, ENGINEERS, CONTRACTORS, BUILDERS, MASONS, AND PLASTERERS, MERCHANTS, SHIPPERS, AND THE PUBLIC IN GENERAL.

JOHNS and CO.'S PATENT STUCCO CEMENT.—The following are the positive advantages possessed by this Invention over every Cement hitherto introduced:—It will effectually resist Damp. It will never vegetate nor turn green, nor otherwise discolour. It will never crack, blister, nor peel off. It will form a complete Stone casing to any Building covered with it. It so closely resembles Stone that it is impossible to detect it. It never requires either to be painted or coloured. It will keep fresh and good in the cask in any Climate for any number of years. It is the only Cement that can be depended upon for export. It is the only Cement that can be used with confidence by the Sea-side. It may be used in the hottest or coldest Climates at any season. It will adhere to any substance, even to Wood, Iron, or Glass. It will carry a larger Proportion of Sand than any other Cement. It matures by age, and becomes perfect when other Cements begin to perish. It may be worked through the Winter, as frost has no effect upon it. It may be used on the Inner Walls of new Houses, which may be papered over or painted directly. Roofs laid or pointed with this Cement will remain undamaged by the severest Storms. Any Plasterer may apply it, the Instructions for use being very clear and distinct. The first cost of this material does not exceed that of the cheapest Cement now in use; but with all the above-named extraordinary and valuable advantages, nothing can approach it in point of economy.

Architects and Builders who have used this Cement have declared that it requires only to be known, to be universally preferred.

Specimens may be seen, and a Prospectus fully describing the Cement and its mode of application, together with a volume of Testimonials from every part of the Kingdom, may be obtained on application at the office of "The Builder," and of MANN and CO., SOLE AGENTS for the Patentees, 4, Maiden-lane, Queen-street, Cheapside, London: of whom also may be had,

JOHNS and CO.'S PATENT STONE-COLOUR STUCCO PAINT, expressly intended for Painting over exterior Walls of Houses that have been covered with Roman or other Cements, and which have become dirty and discoloured. It is in every way better suited for this purpose than White Lead Paint, which will frequently come off in flakes, being in direct chemical opposition with Cement; whereas MESSRS. JOHNS and CO.'S PATENT PAINT having an affinity for Stucco, binds itself with it, stopping the suction, thereby rendering the wall proof against weather, and in the finish producing a pure stone-like effect, produceable by no other Paint whatever. It is cheap in its application,—and may be used by any Painter, in any climate, even in the most exposed Marine situations.

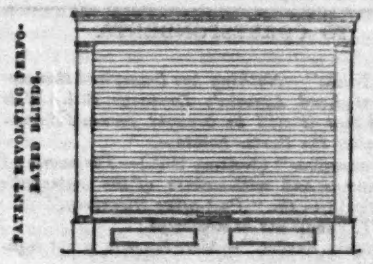
ROMAN CEMENT, &c.
REMOVAL.
THOMAS JOHN CROGGON
Begs to inform the Trade that he has removed to
8, LAWRENCE POUNTNEY-HILL and
THREE CRANES WHARF, 69, Upper Thames-street.
Orders addressed to either place for ROMAN CEMENT of genuine quality will be executed with promptitude and the strictest regard to quality and economy.

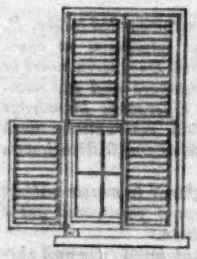
BLUNDELL'S STUCCO PAINT.—An article perfectly resembling stone surface, for the purpose of covering the outside of buildings, has long been a desideratum. This STUCCO PAINT possesses the necessary qualities. It adheres firmly to the walls, resists the action of the weather, and is altogether free from the glossy appearance of Oil Paint. It is laid on mixed with rain or pure river water, and can be made to any required shade or stone colour. Further particulars may be obtained on application to the Inventors, BLUNDELL, SPENCE, and Co., Paint and Colour Manufacturers, 69, Upper Thames-street, London; and at their Colour Works, Hull.

SNOXELL'S PATENT SAFETY REVOLVING WOOD SHUTTERS,
Manufactory, 96, Regent-street, and 131, Chancery-lane.

THE Patentee can confidently recommend these Shutters both for security and durability. The edges being sheathed with IRON, and the cost little more than common shutters, their construction so simple, that the largest establishment can be opened or closed in a few moments with the greatest possible ease without the use of machinery. Their superiority over other Revolving Shutters consists in being made without metal hinges, consequently cannot rust, buckle, or get out of order, and are equally safe. W. SNOXELL will have much pleasure in giving reference to numerous establishments where they are fixed, having on all occasions given the greatest satisfaction.

IMPROVED PATENT CONVEX IRON REVOLVING SAFETY SHUTTERS.
PATENT SAFETY IRON SLIDING SHUTTERS.





The attention of Architects, Builders, Blind Makers, and the Trade generally, is particularly requested to the IMPORTANT patented IMPROVEMENTS in the above enumerated Articles, and inspection invited, at the Manufactory of the Patentees, R. HOWARD and Co., 115, Old Street, London; or at the Licensees.

Engravings and Prospectuses may be had at the above address, or will be forwarded on application.

The great importance of STRENGTH and STIFFNESS in the Laths of REVOLVING IRON SHUTTERS, when required for SECURITY, is so obvious, that it is only necessary to point out the fact that the PATENT CONVEX LATHS ARE 12 TIMES STRONGER THAN THE ORDINARY FLAT LATHS (as shewn by the engravings and prospectus), to ensure their general adoption.

REVOLVING IRON SHUTTERS MADE OF THE COMMON FLAT LATHS, AT A VERY CONSIDERABLE REDUCTION OF PRICE.

CAUTION.—The Patentees beg to caution all persons against Making or Using BENT LATHS for REVOLVING IRON SAFETY SHUTTERS, so as to obtain increased strength or stiffness; as they thereby render themselves liable to legal proceedings for infringing this patent.

Licenses Granted.

REDUCTION IN THE PRICE OF
BUNNETT AND CORPE'S
PATENT REVOLVING IRON SHUTTERS.

THE validity of this Patent being completely established, the Patentees have much pleasure in stating that the very extensive demand, and the employment of improved machinery in the manufacture, have given them an opportunity (of which they gratefully avail themselves) of making a considerable reduction in the price of this well-knownand tried invention, thereby rendering them the cheapest as well as the best iron shutters in use. Every improvement suggested by practical skill and most extensive application has been adopted, and no effective REVOLVING IRON SHUTTER can be constructed without infringing B. and C.'s patent. The worm and wheel, as patented by them, being the only safe, durable, and efficient mode of raising and lowering such shutters, these shutters can be applied horisontally, either above or below the window, or vertically, as introduced by BUNNETT and CORPE, in some of the largest establishments: they are made with bent or corrugated laths, if required.

BUNNETT and CORPE also manufacture
REVOLVING WOOD SHUTTERS,
with their patent raising machinery, or with counterbalance weights, and with proper metallic hinges, without which no shutters can be safe or durable.

BUNNETT and CORPE are likewise Patentees and Manufacturers of METALLIC SASH-BARS, MOULDINGS, &c., IN BRASS, COPPER, OR ZINC, FOR SHOP FRONTS, WINDOWS, SKYLIGHTS, AND VARIOUS OTHER PURPOSES.

Shop Fronts fitted in a superior manner with Iron Shutters, Patent Brass or Zinc Sashes, Moulded Engraved Stall Board Plates, best Plate Glass, and internal Brass Fittings of all kinds, on the most advantageous terms. Estimates given and contracts taken in Town or Country.—All kinds of metal works executed to any design. Metal Drawing, Rolling, and Stamping for the Trade. OFFICE, 26, LOMBARD-STREET, LONDON. WORKS, at DEPTFORD, KENT.

ENCAUSTIC, VENETIAN, and other PATENT TILES and MOSAIC PAVEMENTS may be purchased at MINTON and Co.'s warehouse, 9, Albion-place, Surrey side of Blackfriars-bridge.—Wyatt, Parker, and Co., Agents. The above tiles have lately been considerably reduced in price.

N.B. An assortment of plain and ornamental door furniture, slabs, and tiles for fire-places, &c.

HIP TILES to suit slate roofs in colour; Ridges, with plain or rebated joints, roll tops, and vertical ornaments; drains, many sizes, with plain or socket joints; paving in squares, hexagons, octagons, &c., different colours; roofing, in Grecian or Italian styles, other devices also, or plain; conduits, which do not injure pure water; fire-bricks and tiles; clinkers, and out-door paving; sundry wall-coping, garden-borders, chimney-tops; also tubular and other flues of peculiar material. No agent, but a depôt at 22, WHITEFRIARS-STREET, FLEET-STREET, LONDON, under Mr. PEAKE'S personal care, to supply genuine TERRO-METALLIC goods at fair prices as per quality; also, additional Stock at No. 4 Wharf, Macclesfield-street, South, City Basin.

The TILERIES, TUNSTALL, STAFFORDSHIRE, are near the centre of England, whence boats are sent direct to any inland place; or to the Mersey for the coasts, the colonies, and elsewhere.

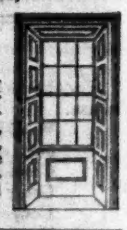
PATENT WINDOW BLINDS.

TYLOR and PACE manufacture every description of WINDOW BLINDS entirely upon their own premises, by the aid of steam machinery, insuring the best materials and workmanship, at the lowest cost. Patent metallic gauze and perforated Zinc Blinds, in mahogany frames, at 1s. 8d. per square foot; ditto, in metal frames, 1s. 2d. per square foot. A large and choice assortment of Transparencies, mounted, from 19s.; Holland Blinds, on plain or spring rollers, Outside Shades, Venetian and Sun Blinds of every description.—TYLOR and PACE'S Show-rooms, 53, Cornhill, entrance St. Peter's-alley.

LAWRENCE AND SON,

SHOP FRONT & SASH MANUFACTURERS,
26 and 27, Tottenham-st. Fitzroy-square.

Shop Fronts of every description executed with dispatch, elegance, and economy. Doors, shutters, staircases, and handrails, upon the most reasonable terms. Glass cases and fittings of every kind prepared on the shortest notice.



HERRING'S PATENT WINDOW for hanging the Sashes, whereby they may be instantly disconnected from the Frames, without removing the Beeding. It is now being applied in Palaces, Castles, Mansions, first-rate Houses, Villas, &c. It is universally approved and adopted by every Architect that has seen it. Builders in the Country will have a full-sized Window forwarded on receiving an order and reference, and taken back if returned within eight days free. To be seen daily. Licences and other particulars had of the Patentee, 14, Kingsgate-street, London.

This invention is exceedingly simple, increases the cost but slightly, and appears to answer the purpose well.—BUILDER, 29th February.

A Premium of 5l. will be given to the first fitter-up of a first-rate House with this Patent, and in proportion for second, third, and fourth-rate Houses.—March 20, 1846.

WALLIS'S PATENT LIQUID WOOD KNOTTING.—This newly-discovered Liquid Composition which Messrs. Geo. and Thos. Wallis have the satisfaction of introducing to the trade, possesses the important qualification of effectually stopping Knots in Wood, however bad, and preventing them eating through and disfiguring the paint above.

Many substances have been used and much time spent in endeavouring to find a cure for a bad Knot, but hitherto without success. Messrs. Wallis therefore feel much pleasure in offering to the public an article so long and anxiously called for.

In the application, skill is not required; it is put on to the work with a brush like common paint, can be used in all climates and situations, and does not require heat.

Sold wholesale and retail, by Messrs. G. and T. Wallis, Varnish, Japan, and Colour Manufacturers, No. 64, Long Acre. Price 20s. per gallon.

STEPHENS'S LIQUID OAK, MAHOGANY, ROSE, and SATIN WOOD STAINS, for Staining various sorts of Inferior Woods, so as to give them the appearance and character of the more costly and ornamental kinds; also for reviving the natural colour of Wood Carvings and Panellings, and other ornamental Wood Work, when such has become faded from age or other causes.

IN THE BUILDING AND DECORATING NEW CHURCHES, where it is desirable to give to the cheaper kind of Woods the appearance of Antique Oak, or to make Deal assume the character of Oak Panelling, whereby the effect of the more costly may be produced by the use of a cheaper material, these Stains will be found more effective than any means hitherto employed.

IN OLD MANSIONS AND HALLS, where the Wood Carvings and Panellings have faded, the applications of these Stains will be found to revive and bring back the rich natural colour, and which colour may be varied from the lighter to the deeper shades of the most Antique Oak.

The BIRCH WOOD, which has a fine natural grain, with little colour, is particularly suited to the application of these Stains; and the appearance which it assumes after Staining is so near that of the natural wood, that is is only when the grain and colour of the latter is particularly fine that it is preferred. Beech, Birch, Elm, Ash, and other Woods, English and Foreign, receive the Stains and produce various imitations.

For the exposed Timbers of the inside of the ROOFS of CHURCHES, for which north country Timbers and Deals are generally used, by brushing them over with the Stain, which operation is very rapidly, and of course economically, effected, the appearance of an Oaken Roof will be produced. For colouring the backs of the Seats, Pews, the fronts of Galleries, the Pulpit, &c., it is equally advantageous.

Prepared by HENRY STEPHENS, and may be obtained at 54, Stamford-street; and at the Office of "The Builder," 2, York-street, Covent-garden, at which places specimens of their application may be seen.